

The Iron Age

A Review of the Hardware and Metal Trades.

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Improved Charging Apparatus for Blast Furnaces.

The introduction of the closed top, or bell and hopper, into the construction of blast furnaces, has done much toward increasing and cheapening the production of iron. It admits of the utilization of a large amount of gases, which were formerly wasted, and places them under the direct control of the furnace manager, who conveys them to the points where their combustion is desired. The bell and hopper arrangement also obviates expensive masonry supporting hot ovens and boilers, or towering stacks, to obtain the required draught.

In the accompanying illustrations we show an improved charging apparatus, invented by Mr. P. L. Weimer, and manufactured by Messrs. Weimer & Birkenbine, blast furnace engineers, of Lebanon, Pa.

The tunnel head of the furnace is fitted with the usual form of bell, hopper and lip-ring, the lower part of the bell and the bottom of the lip-ring being turned off so as to make a tight joint. On top of the hopper is placed an iron cover, provided with three or more openings (the engravings show three openings), which can be closed at will by sliding doors. The rod supporting the bell passes through the top of

dropping the bell a fair approximation of the daily waste of gases from a moderate sized furnace would be from 60,000 to 100,000 cubic feet, a quantity which is surely worth utilizing. This apparatus also obviates the necessary changes in temperature and pressure, which must follow the opening of the full area of the tunnel head every few minutes.

The arrangements of the covering or floor plates is novel; they are cast to fit the shape of the top of the stack with a bevelled segment of a circle taken off at the corners. When laid, these plates are held in position by bevelled washers and counter-sunk screw bolts, which makes a covering free from irregularities, and yet allows sufficient freedom of motion for expansion.

Another peculiarity is the fence. It is composed of cast iron posts, well secured, to which wrought rails are attached by bolts, making a safe but pleasant fence for warm weather, as shown in Fig. 1. When the cold weather sets in, a series of plates can, by loosening the bolts, be inserted between the rails and posts, and made secure, so as to give the proper protection for winter, as shown in Fig. 2. Any part of the fence may be thus protected, and the rest left open.*

A number of iron manufacturers, recognizing the value of the improvements, have

sound of music, and with appropriate gesticulation. In Wynkyn de Worde's "Boke of Keruyng," too, published in 1513, the author tells the carver he must "Set never on fysh, beest ne towle more than two fyngers and a thombe," clearly showing that forks were not in use; and adds: "Your knife must be fayre, and your handes must be cleane, and passe not two fyngers and a thombe upon your knyfe." Yet the fork was employed for certain purposes among our ancestors at least two centuries before this was written. One fork is mentioned in the wardrobe account of Edward I for the year 1297, and Edward II's favorite, Piers Gaveston, had (Fœdera, year 1346) "Trois fourchettes d'argent pur mangier poivre." Le Grand d'Aussy (*Histoire de la Vie Privée des Français*, tom. III, page 179) says that forks are enumerated in an inventory of the jewels of Charles V, of France, for 1379, and this is the only instance he mentions during the middle ages.

On Friday night of last week, at the Bethlehem Iron Works, Mr. Wm. Stubblebine, foreman of the merchant mill (a twelve inch train), turned out nineteen and a half tons of finished iron, beside changing rolls, in the space of nine hours, the actual working time being six hours. This night's work is certainly hard to beat, as eighteen tons of finished iron is con-

These pulleys are made in three sizes—1½, 2 and 2½ inches. The cut represents the 2 inch pulley, full size.

The Outlook for Railroads.

A writer in the *National Car Builder* discusses the prospects of a revival of activity in railroad connection in the following sensible manner: It is futile to expect any improvement so long as there is distrust arising from defaults and rumors of foreclosures and sales under the hammer. These are perhaps unavoidable under the circumstances; yet the transfers to new owners by forced sales may prove in the end to be the most effective means of restoring to railroads their former prestige, and make them once more attractive and paying investments. Many well located roads are incomplete, and cannot do the business legitimately within their reach for want of the necessary equipment, terminal facilities, and other working requisites. They cannot borrow the needed capital to make their past outlays available, and also secure the advantages of a prospective development of traffic along their lines. Their creditors refuse to make further contributions, and desperately resolve to pocket their losses by selling their property to the highest bidder. The buyers in such case are apt to

encouragement from the latter is to diminish the chances for the profitable employment of capital in most other directions. Indeed, it is safe to say that if railroads are to be kept under ban another year by hostile legislation, and distrust on the part of those who have hitherto most profited by them, the excessive supply of capital and labor will be such as to create a very anomalous condition of things—a kind of dead-lock very difficult to deal with.

The fact that nearly 2000 miles of new road have been built during the past year is a hopeful augury of the future. Much of this mileage consists of narrow-gauge and other roads of merely local importance, such as feeders and completed connections; but they have evidently not been built with money borrowed on call. The bulk of the work that is likely to be done in the near future, will be the completion of unfinished lines, the supplying of missing links, and the making of such repairs as will render past expenditures remunerative. In many localities years must elapse before the traffic will be equal to the provision already made for it, while there is elsewhere need of still greater facilities than now exist. The low prices of material and labor afford an opportunity for constructing roads cheaply, a circumstance which is not likely to be overlooked by capitalists who desire to change a dead or du-

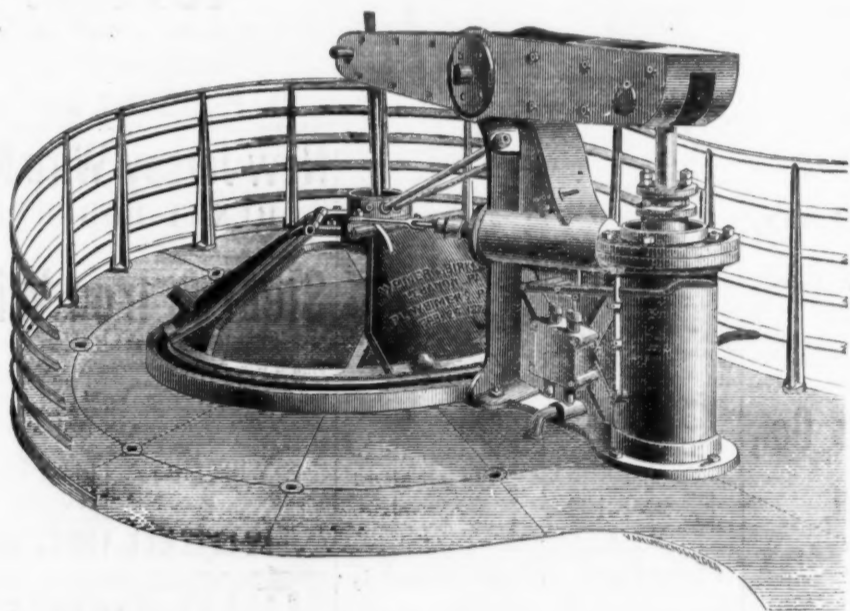


Fig. 1.

WEIMER'S IMPROVED CHARGING APPARATUS FOR BLAST FURNACES.

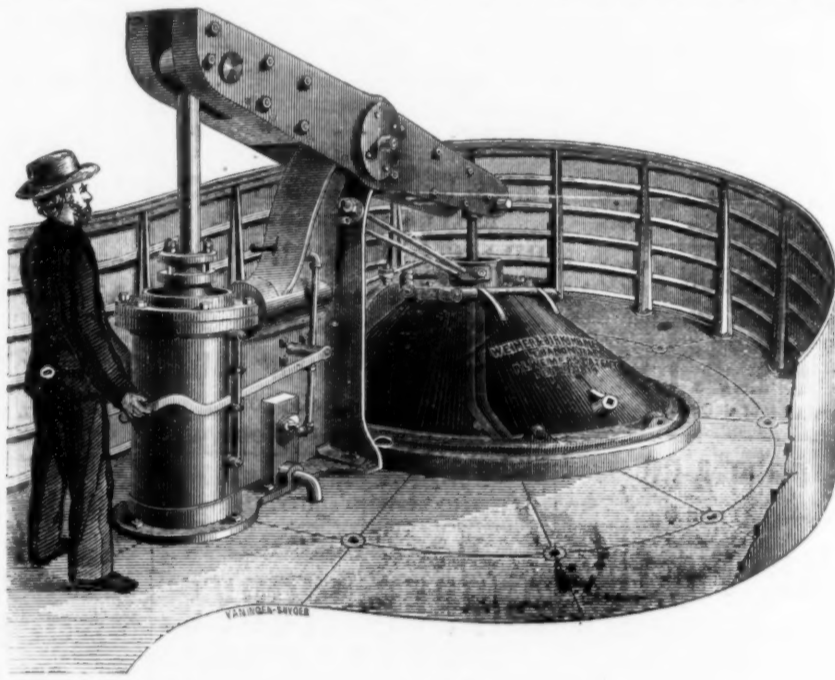


Fig. 2.

the cover, and is attached to one end of a beam, which is supported upon a casting of sufficient strength, combining two cylinders, one horizontal and the other vertical, with their necessary ports, etc. The piston in the horizontal cylinder is connected by means of piston and connecting rods with a revolving plate on top of the cover, to which the doors are attached. These doors are hung on hinges, so that in case of any excessive pressure they will open, or it may at some time be desired to lift one or the other of them. The piston in the vertical cylinder is connected by a piston rod with the end of the beam opposite that to which the bell is attached. Fig. 1 represents the bell closed and the hopper ready for its charge, which is supplied by means of the usual charging barrows dumped through the open doors. When the charge is to be dropped the attendant depresses the left hand lever shown in Fig. 1, which, admitting steam into the horizontal cylinder, causes the plate on top of the cover to revolve and carry the doors with it, thus closing the openings. A small safety valve placed on the cylinder prevents risk of damage by too sudden closing. When the doors are closed the right hand lever, Fig. 1, is raised, which, by admitting steam into the vertical cylinder, drops the bell and its charge. By depressing the same lever the bell is raised again to its position, and the valve arrangement is such that the movement is under the easy control of the operator, who can bring the bell to its place as gently as he pleases. The screw on the rod supporting the bell admits of its exact regulation, and the swivels admit of perfectly free motion; the top of the cover acting as a guide. When the bell is in place the left hand lever, Fig. 1, is raised, which causes the doors to open. Fig. 2 is a view of the apparatus with the bell dropped and the doors closed; it also shows the opposite side of the supporting casting. The apparatus can be operated by steam, air or water-power, and can readily be removed in case any repairs are necessary at the tunnel head. Special provisions are made to obviate difficulty when a bell falls into the furnace or accidents occur. The only gas which escapes is, obviously, so much as can be contained within the space between the bell and the cover, a very small amount. With the usual mode of

adopted them; and we are convinced that the top fillers will be well pleased to be relieved from the labor of manipulating the bell, and be glad to be able to drop the charge without having to retire behind a screen to protect themselves from the intense heat. They will also recognize the value of smooth top covering plates, and a fence which will be alike a protection against both cold and heat.

A Fork of the Bronze Age.

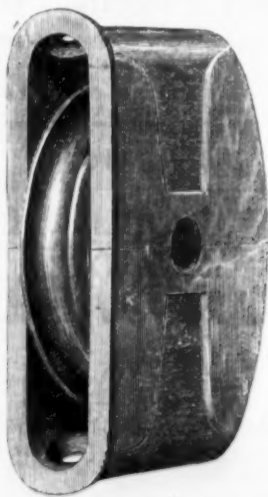
The *Pull Moll Gazette* says: A bronze fork with two prongs, discovered by Mr. George Smith, in the mound of Konyunjik, supplies food for some reflection. If it really is a *bona fide* fork, it is one of the most singular and remarkable relics of antiquity. That "fingers were made before forks" is a proverb the truth of which no one, we presume, is inclined to dispute. But we are apt to forget how very long the people of the west, at any rate, were destitute of forks; and if Mr. George Smith's fork is a fork, as he evidently supposes it to be, another and a very important addition will have been made to the claims of Asia to early superiority over Europe. Neither the Greeks nor the Romans knew anything of forks for eating, although that they had pitch forks from time immemorial, and did not take a hint from them speaks little for their analogical ingenuity. And, notwithstanding that forks were known as rare and exceptional instruments in the middle ages, they were not used either by carvers or eaters of meat even so late as the early part of the sixteenth century among the most advanced in European nations. The Greeks had knives for carving. But when they fed themselves with solid food they did it with their fingers, which they afterward wiped on pieces of bread. When they took soup they used either a spoon or a bit of bread hollowed out. So likewise the Romans fed themselves with their fingers when they ate solid food, and liquid food they took with a spoon (*cochlear*). But they had no forks, although they cultivated carving as an art with considerable assiduity.

The carver, scissor or structor was a person guided by rules, who performed his task to the best of his ability. The cut Fig. 3 does not properly represent the position of the sheets in the closed fence.

sidered a day's work. Beside, four and five men are usually employed at the rolls, while this work was accomplished by three men. This same mill turned out eighteen tons of finished iron every night that week.

Clark's Improved Axle Pulley.

In the accompanying illustration is shown a new style of axle pulley, manufactured by Clark & Co., Buffalo, N. Y., and patented July 15th, 1873. It is constructed without the ordinary face plate. This pulley is not in loose pieces, like others of its class, but is so con-



structed as to firmly hold together and inclose the wheel and axle. The case cannot be wedged apart in fastening it into the frame, and is intended for a mortise when the ends are bored. The facility with which this pulley can be set in the frame is one of its most important features, and should commend it to the favorable consideration of the trade. No screws are used, but simply small nails driven through each end to secure it in position. The illustration shows the pulley made with round ends to fit the mortise as made by the bit. They are also made with square ends to fit a square end mortise.

drive a good bargain, and come into possession with an ample margin of profit and a greatly reduced capital account, ready for a good start when the tide turns.

There are also some roads that should never have been projected, much less built, in whole or in part—visionary and speculative enterprises, starting from nowhere and terminating at any point where the funds gave out. If sold under the hammer, at whatever sacrifice, they would prove as much of a dead weight to the buyers as they were to the original owners. They are the diseased members of the system, and when lopped off the better class of roads are the gainers. Skillful surgery, as well as careful nursing, is necessary to restore the old relations between railroads and capital. The holders of stock and bond securities will in future require some rational assurance of honestly earned interest and dividends; there must be more conservative and less profligate management; fewer inside rings and kindred devices for absorbing resources and earnings. This may seem somewhat rigorous and exacting, but there is evidently no help for it. It will not do to assume that railroad property is to become permanently unproductive, and so repel capital instead of attracting it. The system is too gigantic, too intimately interwoven with the structure and very existence of modern society; it is too great a consumer of the products of labor, and too indispensable to every branch and ramification of industry to be classed among the bubbles that float for a time and then disappear. A railroad, once constructed, is a fixture, so far at least as grading, bridging, tunneling, etc., are concerned, and the capital represented thereby is anchored sure and fast for better or worse.

Now it seems to us that capitalists, as soon as their intelligence begins to get the better of their caution, will see the situation in its proper light; and recognizing the fact that railroads are certain to be constructed and used wherever the need exists, a right discrimination will be made between those which, from their location and management, promise to be ultimately remunerative and those which do not. It must be easy to see how largely dependent are manufacturing and other enterprises upon the prosperity of railroads, and that to withhold

bious investment into a profitable one. The renewals of rails and rolling stock have for a year and a half been restricted to the smallest practicable limit, and further and heavier purchases can not much longer be deferred. This we know is a threadbare argument, but it is a good one; for we maintain that any improvement in the present condition of things must begin where the crash began; that is, with the railroads, which are the basis and mainspring of our industrial prosperity and progress. They must also be sustained by a more tolerant and liberal attitude on the part of capitalists, and this again must be met by a more conservative and economical management of the roads. In this way, and in no other, will the machinery of trade be set in motion, and the vast capital invested in our iron manufactures be vitalized and made productive. General business, if no disturbing element is interposed by unwise legislation, will slowly recuperate, and the exchanges of products will increase the earnings and improve the financial condition of the roads generally.

Lined Iron Pipes.—British patents have been issued for a process of lining or coating wrought or cast iron pipes with lead, tin, or other suitable metal or alloy, or gutta-percha, or a mixture of gutta-percha and other material suitable for preserving and increasing the durability of the pipe and enabling it to withstand, when laid beneath the surface of the ground or otherwise, the action of any fluid, liquid or other matter to which it may be heated or not, an iron or other suitable core or spindle, leaving a space between it and the pipe corresponding to the thickness of the intended lining. The lead, tin, or other material is then melted and forced in by hydraulic or other pressure between the tube and the core. When the lining has cooled sufficiently, the core is removed, and the operation repeated for an additional length of the pipe, where the pipe is too long to admit of the whole being completed in one operation. For coating the pipe, a mold or barrel is passed over the pipe, sufficient space being left between it and the pipe to admit of the desired thickness of coating being applied, the operation of coating being similar to that of lining.

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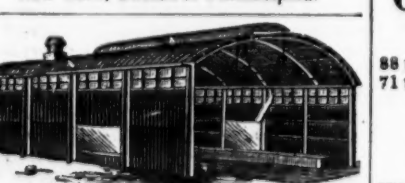
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Manufacture extra quality small Rods, from best se-
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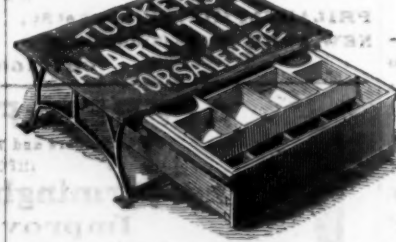
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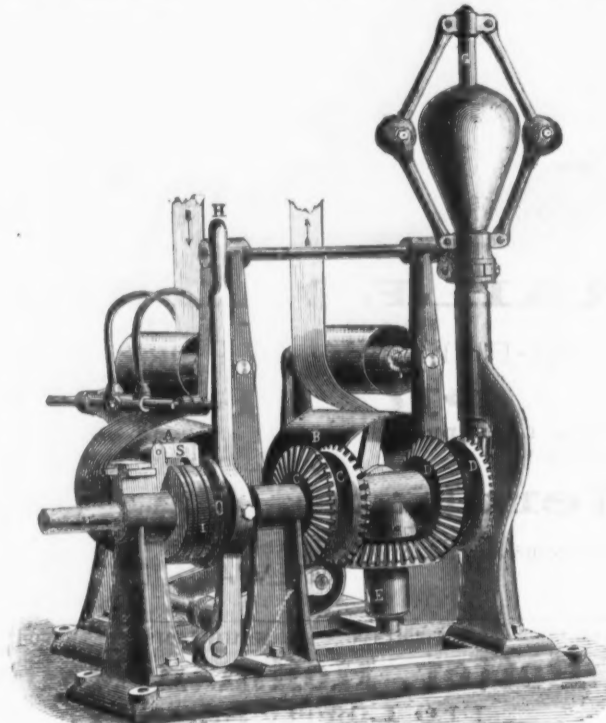


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 Indianapolis, Ind.

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We present herewith a cut of a new governor
 for water-wheels, manufactured by the Hart-
 ford Governor Company, which is being intro-
 duced with great success. The essential prin-
 ciple is radically new, and will prove interesting
 to all mechanical minds, whether specially in-
 terested in its practical application or not. The
 cut shows the principle applied to a governor
 for water wheels through actual trial and practical
 success show that the principle is as well
 applicable to steam as to water.

In this form of governor we have one of the
 few arrangements which give theoretically a
 perfect result; these arrangements, as we re-
 marked in a previous article upon governors,
 are few in number, but when adopted, give,
 both in theory and practice, results which are
 practically perfect. The idea of taking the
 work of moving the gate off from the governor
 and throwing it upon the water-wheel itself is
 peculiarly happy. As would be expected, it
 adapts itself rapidly and almost instantaneously
 to those minor variations of speed which the
 ordinary governors are so unable to manage,



THE WEAVER DIFFERENTIAL GOVERNOR.

The revolving balls are made use of not to
 actuate the gate but to control the position of
 a belt on a pulley which is the frustum of a
 cone, and the speed of which, relative to the
 speed of another common pulley, determines
 whether the gate shall be opened, closed or
 held stationary.

The letter A denotes the conical pulley and B
 the common pulley; both run by the same belt:
 the diameter of pulley A, at the center of its
 face is the same as the diameter of the pulley B,
 which is the same throughout.

The balls are rotated by the water-wheel, and
 go faster or slower with it; they control the
 position of the belt on the conical pulley.

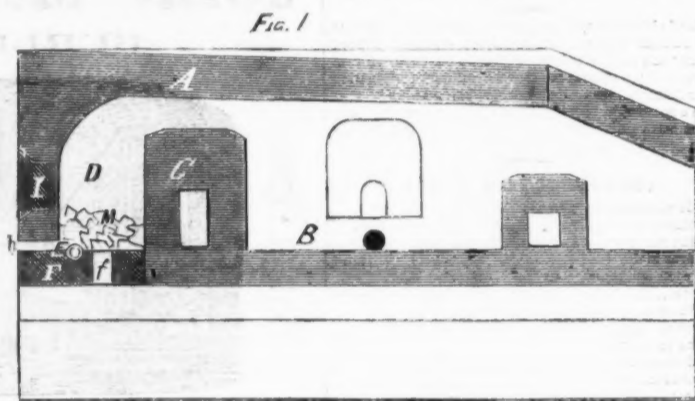
When the speed is at the proper point the balls
 hold the belt in the center of the pulley A, and
 then both pulleys revolve with equal speed,
 but if the balls fall below proper speed then
 the belt changes to the large end of the conical
 pulley and vice versa when the balls rise above
 proper speed, this, of course, with a corre-
 sponding difference in the speed of the pulleys
 A and B.

The bevel gear C rotates synchronously with
 the pulley A, and this bevel gear D synchronously
 in the opposite direction from C, with the
 pulley D both mesh into the gear E on an
 arm which is practically rigid on the shaft F,
 the two gears C D being loose on this shaft.
 When the pulleys A B, and consequently the
 gears C D, rotate with equal speed, the arm
 bearing the gear E remains stationary, but the
 moment the speed of A B and C D differ
 then the gear E will begin to gain correspond-
 ingly on the gear which moves slowest, and
 thereby cause the shaft F to rotate
 correspondingly, and this shaft being properly

and which are so annoying in certain classes of
 manufactures. The company is located at
 Hartford, Conn.

New Patents.

We take from the records of the Patent Office
 at Washington the following specifications of

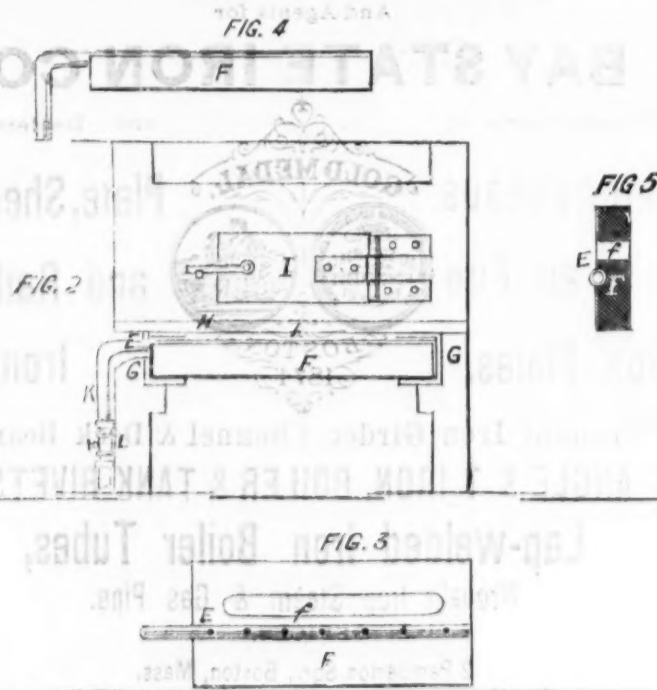


METALLURGIC GAS FURNACES.

certain patents lately issued, which will be
 found interesting:

IMPROVEMENT IN METALLURGIC GAS FURNACES.
 Specification forming part of Letters Patent
 No. 155,564, dated November 3, 1874, issued to
 Richard B. Gough, of Leeburg, and Henry
 R. Gough, of Pittsburgh, Penn.

Figure 1 is a longitudinal vertical section of
 gas furnace. Fig. 2 is an end view of the same.



Figs. 3, 4 and 5 are detached views of the fire
 plate and gas distributing pipe.

This invention relates to a method and appa-
 ratus for using either coal, petroleum, or nat-
 ural gas in heating reverberatory and other
 furnaces; and it consists, first, in combining
 with the fire chamber of reverberatory or sim-
 ilar furnaces a removable slotted fire plate hav-
 ing a perforated gas distributing pipe, the fire
 plate and its distributing pipe being capable of
 introduction through a slot in the end or side
 of the fire chamber; and, secondly, in furnaces
 having perforated gas distributing pipes resting
 on fire bars or a slotted fire plate, slotting the

end wall of the furnace, so as to permit a
 free flow of air and admit of the introduction
 and withdrawal of the fire plate.

Heretofore, in supplying gaseous fuel or
 burning gases in reverberatory or similar fur-
 naces, several methods have been adopted,
 namely: one in which the gas is given off from
 a coking chamber situated in the same plane
 as the hearth, and passed thence through a bed
 of live coal being burned in the furnace; but
 in said construction the impurities of the coal
 and gas are liable to be mingled with the flame
 passing over the bridge wall; secondly, by
 means of gas distributed, by means of pipes,
 over the surface of the burning coal on the fire
 chamber; and, thirdly, by means of injectors,
 by which petroleum gases and oils, together
 with steam and air, forming a mixed gas, have
 been burned within the fire chamber. In the
 latter two methods much difficulty has arisen
 on account of the limited supply of oxygen and
 the liability of much of the gas passing over
 the hearth unconsumed.

The object of this invention is to provide a
 movable fire-plate and distributing pipe for the
 introduction of gas beneath the coke in the
 fire chamber, to provide for free admission of
 air in such a manner as to protect the fire plate
 and promote combustion, and to fulfill such
 other indications as are necessary in the econ-
 omical use of petroleum, coal, or natural gas.
 (By natural gas is meant the gas obtained from
 wells, such wells being of frequent occurrence
 in the oil regions and similar localities.)

In the drawings referred to, A represents the
 wall of the furnace, B the hearth, and C the
 bridge-wall, all of which are of the usual con-
 struction; D, the fire-chamber, constructed as
 follows: In adapting the reverberatory fur-
 nace of the ordinary construction the size of
 the fire chamber, which is usually three feet
 six inches square, need not be altered; but
 where the fire-chamber is constructed with ex-
 press reference to the use of this device the
 length of the fire-chamber may be reduced to
 one foot. The width may be the same as usual.
 E represents a pipe or pipes of suitable diam-
 eter, perforated upon the upper surface by a
 number of holes for the exit of gas, said pipe
 preferably being cast or fitted into or secured
 upon the top of a fire-plate, F, of cast iron or
 of other suitable material. F represents the
 fire-plate to which the pipe or pipes E is or are
 attached. The fire-plate is provided with a
 slot, J, for the admission of air, and rests in
 the channel-plate G, secured in the side walls
 of the furnace. H represents the bearing-bar,
 built into the side walls of the furnace, and
 supporting the brick-work at the firing end of
 the furnace. It rests upon the upper portion
 of the channel-plate G, so as to form an air-
 passage, A, along the end of the furnace, be-
 tween the bearing-plate H and the fire-plate F.
 By this means the gas pipe or pipes E are pro-
 tected by having air-passages to either side, so
 as not to be affected by the intense heat of the
 furnace. F represents channel-plates built into
 the side walls of the furnace, and are intended
 to support the fire plate F and to allow of its
 withdrawal and insertion. I is the firing door
 on the end of the furnace, directly over the
 bearing plate and the channel plates G, through
 which the coke may be introduced into the fire
 chamber, and which may be used to dress and

keep the fire in order. K is a pipe leading from
 the gas reservoir to the gas supply pipe or pipes
 E, said pipe being provided with some point along
 its length with a check-valve, L, to regulate
 the amount of gas passing to the furnace. M
 is a body of coke or other suitable material
 placed upon the fire plate F, through and by
 which the gas is broken up and distributed, and
 which prevents the escape of any unconsumed
 gas into the fire chamber, and increases the
 burning surface and purities the gas.

In adapting furnaces of the ordinary con-
 struction, the fire plate F may be dispensed
 with, the perforated pipe being laid directly
 upon the bars; but in such furnaces the slot
 or opening A must be formed in the end of the
 furnace, to allow of the free draft of air around
 and over the perforated gas supply pipe E.

The operations of our devices is as follows:
 Through the firing door I the requisite quan-
 tity of coke or similar material is placed upon
 the firing plate over the gas supply pipe, form-
 ing a reticulated bed, through which the gas,
 which has been permitted to enter by a proper
 adjustment of the valve L, is broken up and
 distributed, the gas being ignited upon the
 surface of the coke, the coke in turn becoming
 ignited by the flame of gas which issues from
 the pipe or pipes E; or, if a non-combustible
 material has been used, it becomes hot, and
 soon acquiring a red heat, in turn imparts to
 the inflowing gas the requisite heat to prepare
 it for thorough combustion. The gas, in its
 passage through the coke or superimposed
 mass, being purified and distributed, will burn
 evenly, with an intense flame, upon the surface
 of the bed, so that no unconsumed gases pass
 over the fire-bridge, sufficient air being supplied
 by means of the slots or openings J and A, said
 air in its passage tending to keep the gas sup-
 ply pipe at a low temperature. By these de-
 vices either coal, petroleum, or natural gases
 are readily burned without loss or waste, and
 all the indications for perfect combustion—
 namely, an equal supply and distribution of
 the gas, a thorough heating of the same, and
 a full supply of air, are obtained.

The advantages of this method are economy
 in coal and economy in the cost of manufacture
 of iron, and also better quality of iron; purity
 of the flame, which is free from sulphurous or
 other deleterious admixtures. A greater heat
 is obtained in less time, and the furnace may
 be raised to and kept at a working heat more
 readily than by any other method generally
 employed. Economy in cost of building and
 in the area of ground occupied by the furnace,
 which is also an important point, is secured.
 The fix employed for lining the furnace has
 been found to last longer than one subjected
 to the flame of coal fires or the fires generally
 employed.

Claim—1. In combination with the fire cham-
 ber of a reverberatory or similar furnace, the
 removable slotted fire plate, F, having the gas
 distributing pipe, E.

2. The slotted fire plate, F, provided with
 the gas distributing pipe, E, in combination
 with the fire chamber of a reverberatory fur-
 nace, said fire chamber being provided with a
 slot for the admission of air or, above or on,
 a line with the upper surface of the fire plate.

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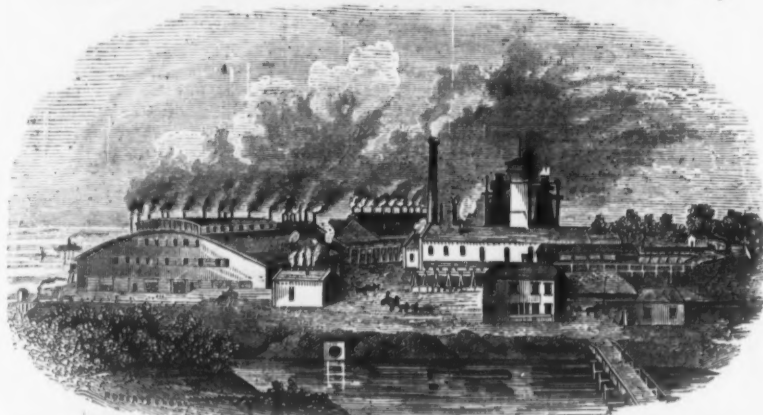
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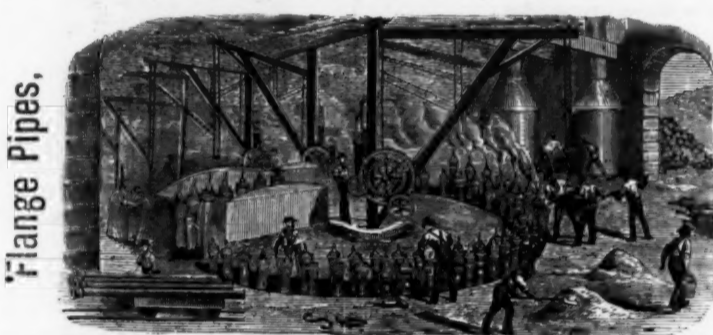
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The Vulcan Iron Works, at Carondelet,
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The Vulcan Iron Works, at Carondelet, seven miles below St. Louis, on the Mississippi River, is an establishment which does credit to Western enterprise. The following description will be read with interest: The blast furnaces of the company are three in number, all large. No. 1 is 60 feet high and 14 feet boshes, with closed top, and has a capacity of about from 13,000 to 15,000 tons per annum. No. 2 is 65 feet high with 15 feet boshes, also closed top, and similar capacity to No. 1. The casting house for these two furnaces are on the west side, and is 90x100 feet. No. 3 furnace has not long been finished, but is looked upon as a model furnace; it is 65 feet high with 16 feet boshes, with a capacity of 15,000 tons per annum, and certainly it has not many competitors.

The casting house is 110x50 feet. The stock house is of frame 600 feet long, 130 feet deep and 60 feet high. Two railroad tracks run into and through the stock-house—one from the Iron Mountain Railroad and the other from the Carondelet branch of the Missouri Pacific. They are used for the transportation of iron, iron ore and rails. Most of the coke is shipped direct from Pittsburgh by rail to East St. Louis and the new station opposite Carondelet, Pittsburgh Landing, and is brought to this shore in the same cars on barges. The coke is then put into small cars and pulled up by an engine. The Big Muddy coal is shipped from Grand Tower direct to the wharf of the works and hauled in the same way. The limestone quarry is situated near the works. There are steam elevators to all the furnace tops, and three large brick hot blasts which are kept up to a temperature of from 800 to 900 degrees. There are 18 steam boilers in batteries of three each; these boilers are heated by waste gas. The engine house is 80x60 feet and 60 feet high, and is a very solid, massive building. The blowing engine for these furnaces is one of Totten's, of Pittsburgh, largest. It is a vertical, low pressure, condensing engine of immense power, but runs with only 20 to 30 lbs. pressure. It is 47 feet high, blowing cylinders 9x9 feet, steam cylinders 60 inches by 9 feet. The two fly-wheels weigh over 30 tons each, and everything massive in proportion, and it is a model of mechanical skill. There are large ore crushers driven by powerful engines; all the large pieces of ore are roasted before being crushed. The Vulcan Iron Co. use only Iron Mountain ore, this being blue specular and red hematite from the Southwest. Their coal is brought from Gartsides mine, some Indiana block coal and coke from Connellsville, Pa.

Most of the pig iron made by this company, outside of what they use themselves, is shipped to the various steel works throughout the country, having been found to be just what is wanted as a mixture in making Bessemer rails. The mills, two in number, are located north of the furnace and are of brick. One, the puddle mill, a solid one-story building, containing two divisions, the top and bottom and the old rail mill, and the puddle mill proper. The size of the first mill is 470x90 feet, the lower story of which is near the river side and is constructed of stone.

Next is a two-story blacksmith shop 70x40 feet. West of the puddle mill, and separated by a yard 60 feet wide, is the rail mill, 300 feet long and 100 feet deep, with an L 125x100 feet. Mr. J. Beynon is superintendent of these mills, which form a part of the Vulcan works. The coal is brought from the stock house on overhead railroads, which pass all around the works, to the places where the fuel is wanted. In the entire mills they use the soft coal from Gartsides' Big Muddy mines. In the whole establishment about 11,000 bushels of coal and coke are consumed for a full day's run.

The puddling mill contains seventeen double and one single puddling furnaces, the top and bottom mills six heating furnaces for making heads and bottoms for rails, and one furnace for breaking down old rails and new iron mixed. These are driven by two engines of 250 horsepower through a set of 28 inches train. The rail mill has ten heating furnaces, driven by an engine with 28 inches train. There is a boiler over each furnace in the puddle mills. The steam goes through pipes into the main pipe, which passes all along the mill under the comb of the roof, whence it is connected by other pipes and flues with the engines. One engine drives the puddle train and another the top and bottom train. The production of this mill is 110 tons of flats in 24 hours. Two sets of Burden squeezers, looking like neat coffee mills, are used. Over the furnaces and machinery, in the puddle mill, are telegraph tracks, from which are suspended the tongs and hooks by which the iron is brought from the furnaces to different points, whenever needed.

The crane used in the rail mill is an improvement made by the former superintendent, Mr. Maharg. A cast iron post is set upon a bracket, bolted to the furnace, which forms the stand, and there is a bracket at the top to support it. This pole holds an iron crane, on which are two pulleys connected with a rod, iron strap and swift, the latter supporting a bar bent at the lower end. The upper end is held by the swift, and the lower carries the pole. By this arrangement the iron can be put in and taken out of the furnace with great ease, the crane sustaining the immense weight, while one hand suffices to direct its course.

The capacity of these works is as follows: Of pig iron they can make 45,000 tons per annum and of rails 50,000 tons per annum. These works are the largest and most complete we have seen west of the mountains, and are owned and operated by a joint stock company having a paid up capital of \$2,000,000, and of which D. K. Ferguson is president, D. E. Garrison is vice-president and general manager, and O. L. Garrison is secretary. The general offices

are situated at No. 221 Olive street, St. Louis. The mills and furnaces ran steadily through the whole year, and now the furnaces are out of blast, but the mills are taxed to about full capacity on Southern and Western orders. The company have just completed a mill for manufacturing light T rails of from 30 to 50 pounds capacity, thus giving them power to make rails of any size from 30 to 70 pounds. The capacity of this latter mill is from 12,000 to 15,000 tons, and these are inside figures. The buildings are of brick and stone, with slate roofs.

The Coal and Iron Ore Trade of Cleveland.

The Cleveland Commercial Review says: The magnitude of that branch of the commerce of Cleveland involved in the coal and iron ore trade does not seem to be generally understood, and we have collected the following figures relative to the trade of 1874 to show, in as simple a form as possible, the source from which a portion of the wealth and prosperity of this magnificent city is derived.

THE IRON ORE TRADE.

Of iron ore there was received during the season of 1874, as follows:

Atlantic & Great Western docks, gross tons, 174,000
Cleveland & Pittsburgh docks, gross tons, 240,000
Private docks, gross tons, 47,000

Total gross tons, 461,000

Of this large quantity of ore there does not appear to be more than enough on hand at present to meet the demand which, in all probability, will continue up to the opening of the next navigation season, and it may, therefore, be regarded as the business of one season.

But the most striking feature of the exhibit is the fact that it is within a few tons of being one-half of the quantity of ore shipped from the mines of the great Marquette iron district during the season of 1874, the total amount sent forward by those mines that year being 385,490 gross tons, the excess over the quantity brought to Cleveland having been distributed to Buffalo, Erie, Detroit, Milwaukee and Chicago by lake, and no inconsiderable portion by rail to furnaces in Michigan and Wisconsin. And as the Marquette district has of late years been furnishing more than one-third of all the iron ore consumed in the United States, it follows that Cleveland distributes a larger quantity of it than any other point.

This is something to be proud of, and something which will sustain pride without boasting. The ore may not be worth more than four millions of dollars on the docks at Cleveland, but a few such drops makes very valuable the entire contents of a bucket.

THE COAL TRADE.

The sources of coal supply for Cleveland are the Cleveland, Columbus, Cincinnati & Indianapolis Railroad, from Columbus and the Tuscarawas districts; the Atlantic & Great Western Railroad, from Youngstown, Girard, Niles, Leetonia, New Lisbon, Dennison and Silver Creek; the Cleveland & Pittsburgh Railroad, from Pittsburgh, Steubenville, and points below; Enon Valley and New Gallalee on the Fort Wayne route, the Massillon region; Mineral Point, over the Tuscarawas branch; Hammondsville, Yellow Creek and Salineville; and by the Ohio Canal from various points on that line.

The following exhibits the amount of coal received in Cleveland from the sources mentioned during the year 1874:

C., C. & I. Railroad, 102,210
Cleveland & Pittsburgh Railroad, 539,908
Atlantic & Great Western, 487,120
" " " anthr., 29,179
Ohio Canal, 142,820

Total net tons, 1,293,277

Estimating this fuel to be worth \$5 per ton on the docks at Cleveland, we have a total valuation of \$6,466,385—another valuable drop in the bucket. It might at first seem as though the value of the iron ore would exceed that of the coal, but a thought will show that whilst, on the one hand, Cleveland distributes coal to all the Western lake ports, reaching, to a greater or less extent, over six States and a portion of Canada, and is a large consumer herself—on the other hand, her ore trade is confined to home consumption, the Mahoning and She-nango regions and Pittsburgh.

But thirteen millions of dollars per annum, realized from but two items of trade, is a result of the most gratifying character, and more particularly, when these two items place Cleveland as the leading city of the lakes in these items of commerce.

The Monitor gives the following interesting statistics respecting the wages earned by the different classes of artisans in France. It states that the average daily wages obtained by those employed in the sixty-two trades recognized by the state in 1853 was 1.59f. In 1871 the daily wages averaged 2.65f., or an increase of 40 per cent. Workmen boarded by their masters are paid about half less, but except in the country a workman is seldom boarded by his employer, and these statistics do not apply to country workmen. Of all trades, the lowest wages are those of the weaver, who earns only 1.94f.; next come the pastry cook, who is paid on the average only 2.31f.; the shoemaker, 2.34f.; and the rope-maker, 2.36f. The highest wages fall to the lot of the ornamental sculptor, who earns 4.50f.; the watch maker, 3.43f.; the metal-turner, 3.47f.; the stonecutter, 3.47f.; and the jeweler, 3.58f. The class of workmen whose wages have increased the least since 1853 are the pastrycooks, whose earnings have only risen 17 per cent., while those of the bakers, on the other hand, have increased 54 per cent. The trades that have made the greatest progress are barbers and sawyers, and their wages have augmented 65 per cent. The average wages of workmen in all branches of trade, taken together, is 2.90f., and those of women 1.29. Lace-makers earn 1.71f.; artificial flower makers, 1.70f., whose trades pay the highest wages to female workers. The increase in women's wages during the above mentioned period has been 35 per cent. In Paris wages greatly exceed the above-mentioned averages; there ornamental sculptors earn 7f. per day; watchmakers, 2f.; jewelers, 6f.; metal-turners, 6f.; stonecutters, 6f.; and rope-makers, 4f. The average wages of the Parisian workman is 4.50f., and those of workwomen, 2.75f.

Reasons for Using our Goods.

Hogs when ringed are prevented from rooting, and fatten quickly.

Pastures and clover fields are kept smooth and are not destroyed by the hogs rooting them up.

Feed lots in the winter are kept smooth, and corn that is otherwise rooted and tramped into the ground is saved.

The **Triangular Wire Ring**, manufactured only by us, is the only wire ring that can be inserted in the hog's nose with one grip on the **Ringer**, and is the only ring that will remain in a hog's nose, as it fits close, will not turn in for the joint to irritate the nose, is not liable to be torn out, and heals quickly.

No puncturing of the nose required to insert our ring.



SOMETHING NEW.

We shall this present season make a **Heavy Tinned Wire Ring** that will not rust in the hog's nose. The strongest and best ring in the market.

Prices.

Ringers, retail \$1 00
 " per doz. 6 00
 Rings per box (100) coppered wire 50
 " per doz boxes (1200) " 3 00
 " per box (100) tinned wire 60
 " per doz. boxes (1200) tinned wire 4 00
 Tonges or Holders retail 1 25
 " " per doz. 9 00

The coppered wire ring will be sent unless otherwise ordered.

Samples by mail postpaid on receipt of retail price.

Goods sent C. O. D. with privilege of examination before paying charges.

Net prices in quantities, circulars and posters mailed free.

Our advertisements are now inserted in over 1800 newspapers, published in every State of the Union, so that dealers will find a large demand created for our goods.

THE NICHOLSON FILE.

All *Nicholson Files* are cut with the *Patent Increment Out*, an invention owned and controlled exclusively by us, the file cut in this manner being Patented as a new article of manufacture, and differs from all other machine cut files (all of which have their teeth cut with equal spaces) by being cut with teeth slightly *expanding or increasing in size and space from the point*, thus avoiding the too great regularity of teeth common to all other machine cut files. The tendency of all cutting tools with teeth or cutters placed at regular distances from each other may be illustrated (to the machinist at least) by the fluted reamer—as it is well known that if a round reamer be made with (say 12) teeth whose spaces are equidistant, the hole reamed will *not* be round and smooth, but will approximate to a hexagon in shape. Whereas, if the same number of teeth be made of irregular distances, the hole reamed will be both round and smooth. The same is true of a file, hence the necessity of its having teeth at unequal distances, and to which we have applied the name of *Increment Out File*, which possesses all the advantages of hand cut work, and the accuracy and uniformity of machine work. It is now upwards of seven years since this File was introduced to the public, and the demand has increased until our production is undoubtedly treble that of any File manufactory in the country.

We put all files under seven inches in boxes of either one-half or one dozen each. These boxes are neatly arranged, and open on the end, on which the kind is plainly marked with printed labels, acknowledged improvements on the old methods.

The "*Increment File*" is not an experiment, but an established fact, and already has acquired a legitimate demand or upwards of 500 dozen per day. We employ no *regular Travelers*, but our goods may now be found in the hands of the principal jobbers and dealers throughout the country.

Prices and terms will be forwarded on application to

NICHOLSON FILE COMPANY,
 Providence, R. I.

USE THE BEST.



Pawtucket, R. I.

The American File Company have the exclusive right to use the Bernot process for cutting files. By this method all the advantages of hand cutting are secured, together with an accuracy unattainable in hand work. They are the only manufacturers who employ machinery for testing files and steel.

Goods of all known manufacturers have been repeatedly tested, and interesting tables have been compiled showing the working qualities of files made by different makers, and of files made from different steels, and with various shapes and angles of tooth. They have thus reduced the manufacture of files to an exactness and perfection with a uniformity of result, as they believe, never before attained. No file, foreign or domestic, that they have ever tested, has equalled the performances of their own goods taken at random from their stock. Their machines are capable of the most delicate adjustment, and can produce the very finest work known to the trade. Special files made to order. Prominent file manufacturers are having their best goods from our works.

Price lists and information furnished on application.

AMERICAN FILE CO., Pawtucket, R. I.

FILES
 AND
RASPS.
XTRA QUALITY,
 MADE FROM THE BEST
IMPORTED STEEL
 BY THE
Auburn File Works,
AUBURN, N. Y.

JOHN ROTHERY'S

brated Hand-Cut FILES,

Cele. Made of Best English Cast Steel.

WALSH, COULTER & FLAGLER, Sole Agents,
 83 Chambers and 65 Reade Streets, N. Y.

EDWARD PHELAN,
 of W. F. SHATTUCK & CO.,
 Surviving Partner,
 No. 113 Chambers and
MANUFACTURER OF

Cross & Taff's Pat. Wrenches,
 Ave. Pick, Sledge & Hammer
 Bands,
 Grinders and Gimlet Bits,
 Augers and Auger Bits,
 Coon Nut Borer
 Wire Seives,
 Scale Beams,
 Patent Tap Borer,
 Brundage Horse, &c.

AMERICAN HARDWARE.
 95 Reade Streets, New York,
 ers. Maguire's Wrt Iron Goods,
 Whittuck's Platform Counter
 Scales,
 Yaw's Cow Bells,
 Axes, Picks and Hatchets.

DEAN'S New Patent (1873)
Screening Scoop
SHOVEL

For Coal, Coke and Coal
 Ashes, and other
 Substances.

The largest frames are 12 by 18
 inches, with seven bars, and are
 made of the Best Malleable Iron.
 They are, or can be, wired be-
 tween bars by an arrangement of
 holes a quarter of an inch apart,
 by an ordinary person, to screen
 any size substance desired. They
 are warranted to be the most du-
 rable and practical Screening
 Shovel made, or money refunded.
 Reference—All New York Gas
 Companies and Hotels.
 For smaller sizes on hand.
 Please address orders to

A. SEE & SON,
N. Y. Shovel Works,
1358 Broadway, N. Y.
 Price: Largest size \$30 per doz.,
 and upwards, according to size of
 spaces.

Clement & Hawkes Mfg. Co.,
 Manufacturers of
SHOVELS,
 Planters' Hoes, Trowels and Machinery.
 Northampton, Mass.
 Send for Circular and Price List.

Schweitzer Mfg. Co.,
 57 Reade St., N. Y.
IMPORTERS & JOBBERS.

Established 1816.
Peter A. Frasse & Co.,
 95 Fulton Street, New York,

SOLE AGENTS FOR

Thomas Turner & Co.'s Suffolk Works,
SHEFFIELD.

FILES AND HORSE RASPS,

And Importers of

STUBS' FILES, TOOLS & STEEL,
W. J. Davies' Sons' London Emery Cloth,
HUBERT'S FRENCH EMERY PAPER.

EVERY FILE WARRANTED.

Equal to the

BEST.

Western Files.
 Works, Beaver Falls, Pa.
Western Files.
 Office, 96 Chambers St., N. Y.
Western Files.
 LARGEST CAPACITY
 Of any File Works in the World.
 In the face of strong prejudice against American files, this brand has
 earned a reputation second to none. The trade in all sections testify to their ex-
 cellence. We confidently offer these files as superior in every respect and cheaper than
 any first-class file in the market. A trial will confirm their reputation.
MINOT & CO., 239 Franklin St., Boston, New England Agents.

McKINNEY MFG. CO., Hamilton, O.

Wrought Butts,
 Strap & T Hinges.
 Send for special discount
 sheets.

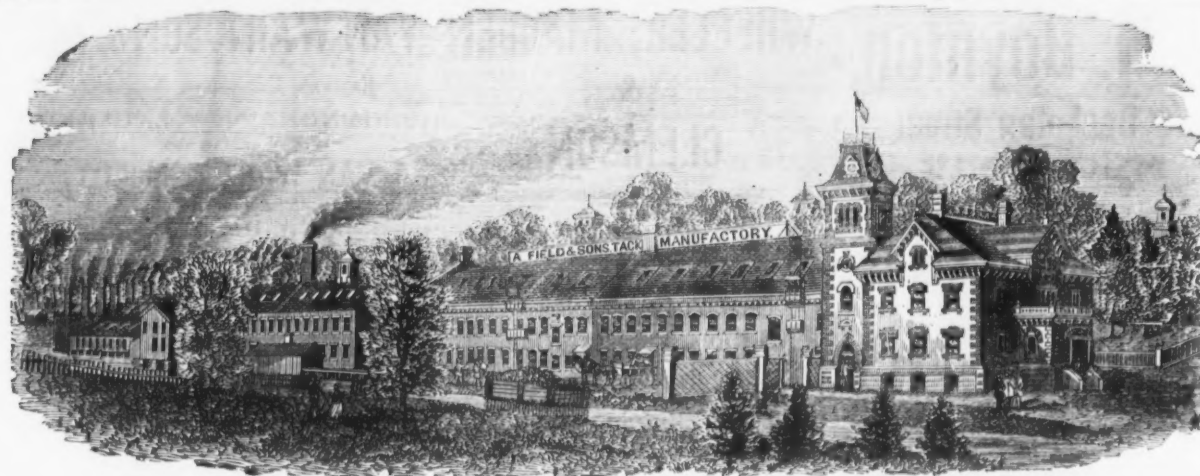
"CHAMPION" Hog Ringer and Rings.



The only Ring invented that will effectually prevent Hogs from Rooting.
 Being a Double Ring it is equal to two or three of any other Ring. Having no sharp points in the flesh
 it does not cause irritation or soreness as in other Rings. The smooth part of the wire being in the nose,
 it heals rapidly. One of our rings being equal to two or three of any other ring, makes this ring cheaper
 than the cheapest ring in the market. Time and money saved in using the Champion Hog Ringer. One
 operation and the work is done.

Price of Hog Ringer, 75c. each. Price of Tinned Hog Rings, 60c. per 100.
 Coppered Hog Rings, 50c. per 100. Hog Holder, 75c. each.
 Discount to the trade.

CHAMBERS & QUINLAN, Exclusive Manufacturers,
DECATUR, ILLINOIS.
Original Manufacturers of Tinned Rings.



A. FIELD & SONS,

TAUNTON, MASS., Manufacturers of

Copper and Iron Tacks, Tinned Tacks,

SUPERIOR SWEDS IRON TACKS, for Upholsterers' Use, Saddlers' Supply, Card Clothing, etc., etc.

American and Swedes Iron Shoe Nails,

Zinc and teal Shoe Nails, Carpet, Brush and Gimp Tacks, Common and Patent Brads, Finishing Nails, Annealed Trunk and Clout Nails, Hob and Hungarian Nails,

Copper and Iron Boat Nails, Patent Copper Plated Tacks and Nails, Fine Two Penny and Three Penny Nails, Channel, Cigar Box and Chair Nails, Leathered Carpet Tacks, Glaziers' Points, etc., etc.

OFFICES AND FACTORIES AT TAUNTON, MASS.

WAREHOUSE AT 35 CHAMBERS STREET, NEW YORK, where may be found a full assortment of Tacks, Brads, &c. for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above named goods made from samples, to order.

OTIS PASSENGER —AND— FREIGHT ELEVATORS

For HOTELS, OFFICE BUILDINGS, STORES, WAREHOUSES, FACTORIES, MINES, BLAST FURNACES, &c.

OTIS BROTHERS & CO.

SOLE MANUFACTURERS,

348 Broadway, New York.

EMPIRE PORTABLE FORGES

NO BELTS, BELLOWS OR CRANKS.
The Best Made.

Send for Catalogue to the
Empire Portable Forge Co., Troy, N. Y.

THE CANADIAN BANK OF COMMERCE.

Capital - - \$6,000,000, Gold.

Surplus - \$1,800,000, Gold.

The New York Agency, 50 Wall St.,

Buy and sell Sterling Exchange, makes Cable Transfers, grants Commercial Credits, and transacts other Banking Business.

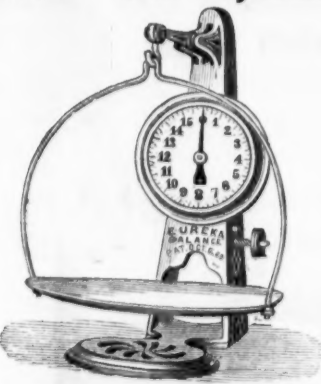
J. C. HARPER, Agents.

J. H. GOADBY, Agents.

HOISTING Machinery

Mfd. by
CRANE BROS
MFG. CO.,
Chicago.

Eureka Self-adjusting



SCALES.

Have a patented attachment for ascertaining the tare of a dish or other receptacle used in weighing without the use of weights or loss of time.

Manufactured only by

JOHN CHATILLON & SONS,

91 & 93 Cliff St., N. Y.

CROCKER BROTHERS, 32 Cliff Street, N. Y. METALS.

Anthracite Pig Irons,

COLD AND WARM BLAST CHARCOAL IRONS,

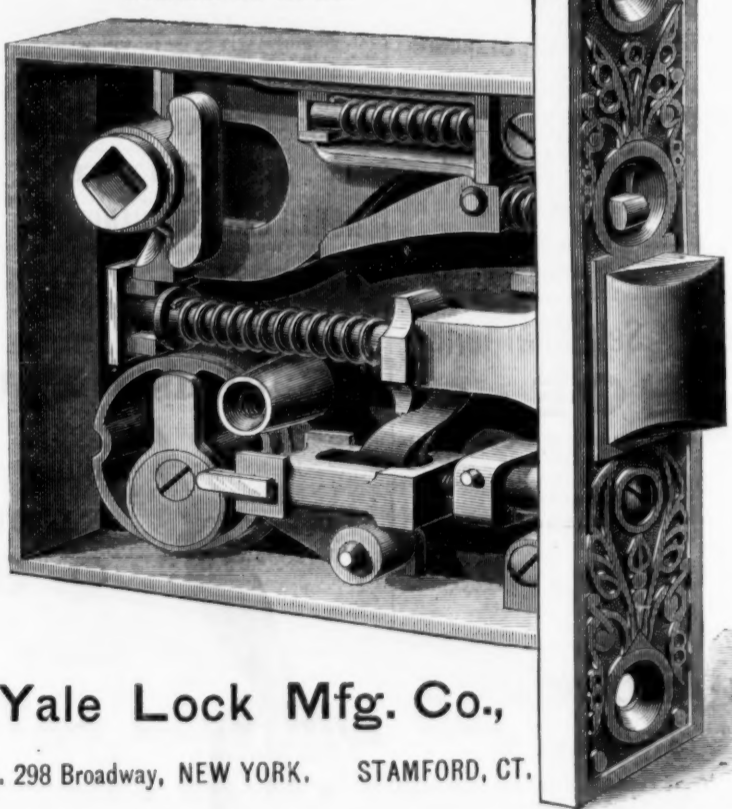
American and English Bessemer Irons, Iron Ores.

COPPER, TIN, &c.

Advances made on Merchandise.

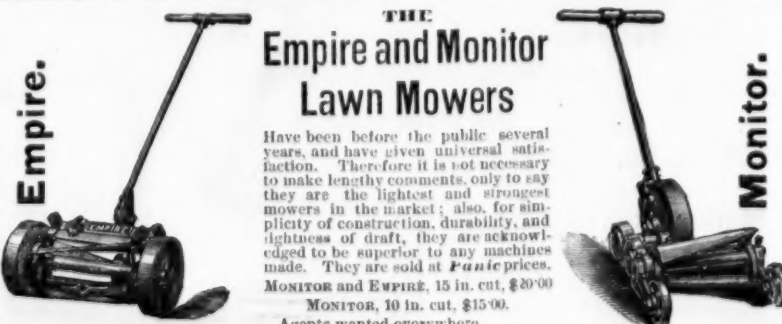
Yale Mortise Night Latch No. 70.

WITH CAP REMOVED SHOWING
INSIDE OF LOCK.



Yale Lock Mfg. Co.,

No. 298 Broadway, NEW YORK. STAMFORD, CT.



THE Empire and Monitor Lawn Mowers

Have been before the public several years, and have given universal satisfaction. Therefore it is not necessary to make lengthy comments, only to say they are the lightest and strongest mowers in the market; also, for simplicity of construction, durability, and lightness of draft, they are acknowledged to be superior to any machines made. They are sold at Panic prices.

MONITOR and EMPIRE, 15 in. cut, \$20.00

MONITOR, 10 in. cut, \$15.00.

Agents wanted everywhere.

MANUFACTURED BY

BARLOW & WALKER, Sing Sing, N. Y.

BUSINESS ITEMS.

NEW YORK.

The Albany & Rensselaer Iron and Steel Company has just been organized at Troy, and takes the place of the firm of John A. Griswold & Co., which has been dissolved. The new enterprise goes at once into full operation, and continues the business of the former firm. It also includes the Albany Iron Works, lately owned by Erastus Corning & Co. Of the new corporation Erastus Corning is president; Chester Griswold, vice-president; James E. Walker, general manager, and Selden E. Marvin, secretary and treasurer. This corporation embraces probably a larger tonnage than any other manufacturing organization in the United States, each of the consolidated firms having owned extensive works.

It may be dull times among manufacturers generally, but the Island Works, at Seneca Falls, are an exception. They keep up their full force of workmen. They make steam fire engines of superior excellence, and have recently shipped Silsby steamers and hose to Wilmington, N. C., Carthage, N. Y., Mobile, Ala., Stratford, Canada, Kenosha, Wis., and to Austin, Texas. A large number of steamers are now being built under contract at the Island Works, and orders still come in. The proprietors employ a large force of workmen, many of whom work over-time.

The Schenectady Locomotive Works have 150 men employed, but the force is to be increased. Work has been begun on an order for 12 heavy ten-wheeled engines for the Central Pacific.

The Buffalo Iron and Nail Company's furnace, at Buffalo, which was blown out last month, after a successful run of fifty-one months, will be put in order for blowing in at once. The company consume the iron produced at their furnace in their rolling mill and factories.

NEW JERSEY.

The Phillipsburg Manufacturing Company is to be dissolved, and the works at Phillipsburg sold to a new company which will continue the manufacture of bridges and wrought iron work on a larger scale.

The owners of the Jersey City Steel Works have bought the old rolling mill property at Elizabethport, and propose erecting large buildings there, to which the steel works will be removed.

PENNSYLVANIA.

Perrottet & Hoyt, Columbia, were in constant operation through the winter, principally on furnace and rolling mill work, gas works, Siemens' gas producers, etc., together with some steam engine and other machinery.

Riehle Bros., proprietors of Philadelphia Scale and Testing Machine Works, have recently furnished the Cambria Iron Co., Johnstown, with a testing machine of 150,000 lbs. capacity, for testing the tensile and crushing strains of iron &c., of almost any length.

The Gibbs & Sterrett Manufacturing Company, at Corry, are now employing about 250 men, and will no doubt increase their force to 300 soon. Their works have the appearance of a huge bee hive. A short time ago they contracted with the State Grange, of Missouri, for 500 reapers for the coming season, and last week, Mr. Clark, Master of the State Grange, of Oregon, who had been in attendance at the session of the National Grange, at Charleston, South Carolina, returned this way, and was so well pleased with the reapers that he made arrangements for 100 to be sent to the Pacific coast.—E.E.

The Pittsburgh and McKeesport Car Company has orders for a narrow gauge engine and a number of cars for the Ohio and Toledo Road, beside some engines for shifting at furnaces.

Large orders are on hand at the Susquehanna Iron Company's Rolling Mill, Columbia, and the mill is now running full double turn.

There are good prospects that the Watson-town Car Works will soon be in operation.

Stouffer, Porter & Co., of Connellsville, manufacture frogs, switches, bridges and pit cars, beside tools and general machine work. Their works have run steadily during the past year, and have turned out a large quantity of castings for the Cumberland and Pennsylvania Road, beside the other work.

The New Brighton News says: The old Anderson foundry, of Rochester, has been put in operation through the agency of the Co-operative Foundry, at Beaver Falls. G. Y. Marks, Esq., is the principal manager of the newly started works, and enters upon his work determined to make it a success. Judging from the former success of the company, we have no doubt they will succeed well in the foundry at Rochester.

It is stated that in case the Allegheny Valley Rolling Mill, at Kittanning, is not rented to a New York firm, the proprietors intend running it themselves as soon as it can be put in proper repair.

The Lemont Furnace Company, says the Uniontown Genius of Liberty, has engaged a first-class furnace man to superintend the erection of the new furnace, and he will commence operations as soon as the weather will permit. There is a very strong probability that a new furnace will also be commenced before long at Mt. Braddock, by Beeson, Hogsett, Watt & Co. The parties interested have had the matter under discussion, and we understand it is the determination to push it to completion at an early date.

Cole & Heilmann's Boiler Works, at Allentown, which had no iron for some days, and consequently stopped work, resumed full operations on Monday morning.

The orders for blowing out the blast furnaces of the Phoenix Iron Company, at Phoenixville, have been countermanded, and they will continue in operation.

Six hundred men are working on full time

Erie shops at the Susquehanna depot. The shops are filled with disabled locomotives and broken down machinery.

Glen Rolling Mill, at Allentown, is to be started on the co-operative plan.

MASSACHUSETTS.

Hawkins & Burrell, of Springfield, have just completed a new iron bridge of two spans, 104 feet each, for the Cheshire Railroad, at Troy, N. H.

In addition to the other work on hand, the Wason Manufacturing Company, at Springfield, is building some passenger coaches for the Illinois Midland Road.

VERMONT.

The rolling mill of the St. Albans Iron and Steel Company, at St. Albans, resumed work March 2, after a stoppage of four months. Six heating furnaces are in blast. The puddling mill is running single turn with all the furnaces.

MAINE.

The Portland Rolling Mills have started up after remaining idle about a month while undergoing repairs. The mills turned out 14,650 tons of rails last year.

The Knowlton Platform and Car Coupling Company has been organized at Rockland, for the purpose of manufacturing platforms and car couplings, under the patents issued to C. H. Knowlton, Nov. 26, 1872, and April 1, 1873. Its capital stock is \$50,000.

OHIO.

The North Toledo Engine Company, of Toledo (formerly the Perkins Engine Company, of Fort Wayne), occupy two substantial brick buildings, one of which is 120 feet long by 40 broad, and the other 83 feet long by 40 broad. These are fitted up for the foundry, machine shops, forges, pattern room, &c. In addition to this, the company has a dock 320 feet long by 30 broad, extending into the river. A switch connects the works with the Canada Southern Railroad. The company has a capital of \$35,000, and the capacity of the works is one six-horse engine per day.

The firms of Scoville & Chase, and Scoville, Chase & Smith, of Cleveland Tube Works, have recently dissolved. Mr. Scoville will continue the manufacture of wrought iron pipe, boiler tubes and steam heating apparatus, and Mr. Smith will continue to manufacture steam radiators, and to contract for steam heating apparatus, and the ventilating of buildings, for which he will furnish plans on application.

INDIANA.

Both of the rolling mills at Indianapolis have resumed operations, after being closed for several weeks for want of coal. These mills employ 600 men. They have orders ahead for more work than they can do, and will continue to operate unless compelled to suspend again for the above reason.

The Southwestern Car Works, at Jeffersonville, has taken a contract for 100 freight cars for the Terre Haute and Indianapolis road.

KENTUCKY.

The Kentucky Rolling Mill, at Louisville, has been improved by the addition of new machinery for the manufacture of light T rails and street rails, and its trade therein is constantly increasing.

CALIFORNIA.

The wire rope works of A. S. Hallidie & Co., San Francisco, have been entirely remodeled during the past year, at an outlay of \$50,000. New and ingenious machinery and labor saving apparatus have been put in, and the capacity of the works trebled. Some of the ropes made at these works are of immense size. The steel rope used on the Clay Street Hill Railroad, 7000 feet in length, 3 inches circumference, was made in one piece, and also a steel rope for one of the Virginia mines, 2400 feet long, 6 1/2 inches circumference. There are 30 men employed in the establishment, and about 30,000 lbs. of refined steel and other ropes are turned out for mining purposes per month. Galvanized wire rope, for ship rigging, is an important part of this industry. The ropes made here are in very much favor with the riggers, and are sold at half the cost of hemp rope. Within the past three years these works have turned out some submarine telegraph cables, from one to six miles in length. This also promises to be a growing branch of industry. The business extends to Mexico, Japan, British Columbia, and as far east as Colorado.

The Labor Troubles in Pittsburgh.

We take the following from the Pittsburgh Commercial, of the 11th inst.: One of the results of the meeting of the rollers and heaters, Tuesday, was developed yesterday morning at the works of the Pittsburgh Bolt Company, all the men who ceased work when the colored boilers were introduced at the works resuming operations. The mills are now running with their full complement of operatives. At the meeting, Tuesday, it was argued that so far as the boilers were concerned, the working of muck iron produced by negro boilers was no worse than the working of that brought from the East and elsewhere. Since the beginning of the lock-out the boilers have used all the influence they possessed to induce the rollers and heaters to join them in resisting the demands of the iron masters for a reduction in their (the rollers') wages. At the meetings of the rollers and heaters the subject has been thoroughly discussed, and the sentiment among this class of iron workers has all along been decidedly against any interference in the lock-out. It was argued by them that so long as their employers asked no reduction of their wages it was not their business to inquire where the muck iron came from. The leading boilers, we learn, were not opposed to the resumption by the men at the bolt works, "because," said they, "if the rollers and heaters at the other mills decline to aid us, by striking against the use of Eastern muck iron, it would not be fair to ask the men at the bolt works to strike against the use of muck iron produced by the negroes." It may be safely said, therefore, that there will be no further interference with those men by the boilers.

GEORGE GUEUTAL & SON,
39 West 4th St., New York.
IMPORTER OF
Wood Screws, Steel in Sheets,
BAND SAWS, TOOLS FOR BRAZING, &c.
Bed Screws, Pin Hinges, and Wire Nails a Specialty.

H. W. PEACE,
MANUFACTURER OF
Saws of all kinds.
FACTORY, WILLIAMSBURGH, N. Y.

Elliptic Forked Saw Frame.
Patented June 28th, 1870.
The annexed engraving represents my ELLIPTIC FORKED SAW FRAME, which commends itself to the trade for its simplicity of construction. The Forked Frame being all in one piece, without any center bolt, secures the frame great strength and durability. These frames are put up with my best Webs, marked "No. 40, Harvey W. Peace."
HARVEY W. PEACE,
Sole Proprietor & Manufacturer,
VULCAN SAW WORKS,
WILLIAMSBURGH, N. Y.

**THE SILVER STEEL
DIAMOND CROSS-CUT SAW.**
\$1.50 Per Foot. Patent Secured

THIS new Saw, which is destined to take the place of all Cross-cut Saws in point of **SPEED AND EASE**, is manufactured by **E. C. ATKINS & CO., Indianapolis, Ind.**, who are the **SOLE MANUFACTURERS FOR THE UNITED STATES.** So confident are we that this is the best Cross-cut Saw in the market that we **CHALLENGE THE WORLD.** Orders promptly filled.
E. C. ATKINS & CO.
Saw Manufacturers and Repairers, Indianapolis, Ind.

Lloyd, Supplee & Walton,
HARDWARE FACTORS.
MANUFACTURERS OF

**Bonney's Hollow
AUGERS.**

Stearn's Hollow Augers
and Saw Vises

Bonney's Spoke Trimmers
Double Edge Spoke Shaves
Adjustable Gate Hinges
Scandinavian Pad Locks

Flat Key Brass and Iron Pad Locks, &c., &c.
625 Market St., Phila., Pa.

**BILLINGS & SPENCER COMPANY, Manufacturers of
Clamp Lathe Dogs.**

Under Billings' Patent Process.
And Hardened.
A First-Class Article, and something that every machinist and Tool Maker will appreciate.
WROUGHT IRON AND STEEL DROP FORGINGS
of every description. Machine Handles, Lathe Wrenches, Thumb Screws, Milling Machine Cranks, Spanners, Parts of Sewing Machines, Guns, Pistols, Drill Chucks, and MACHINERY GENERALLY.

THE BILLINGS PATENT SEWING MACHINE SHUTTLE,
Thirty Varieties now made, Forged Solid from Bar Steel and Cold Pressed. Also,
The Barwick and Wheatcroft

Patent Self-Adjusting PIPE WRENCHES, of all sizes.
Illustrated Circulars and Price List sent to any order on request.
Lawrence St., Hartford, Conn.

E. M. Boynton,
80 Beekman Street,
NEW YORK,
Manufacturer of

Saws of all kinds.
Also Sole Manufacturer of
LIGHTNING SAWS.

Two Direct Cutting Edges, instead of one Scraping point.
Note extra steel and durability over the old V, outlined on M tooth.
Telegram Dated Oct. 1st, 1874.
STATE FAIR, EASTON, PA.
To HENRY DISTON & SONS: Philadelphia, Pa.
I want you to publicly test that challenge on Cross Cut Saws. Name time and place within thirty days. American Institute preferred. E. M. BOYNTON.

E. M. Boynton gave on Wednesday of last week an exhibition of what his Lightning Saw could do at the Pennsylvania State Fair, in which two men sawed through a sound oak log, 16 inches in diameter, in 17 seconds. Mr. Boynton informs us that his export trade is increasing, he having lately made large shipments of his saws to Australia and other distant markets.—*The Iron Age*, Oct. 8, 1874.
For fuller report of this exhibition see the *Easton Morning Dispatch* of Oct. 1st, 1874.
Henry Diston & Sons cannot furnish Lightning Saws. Why do they imitate mine?

J. FLINT,
Manufacturer of
**ALL KINDS OF
'SAWS**
And Plastering Trowels,
ROCHESTER, N. Y.

A large stock of Cross Cut Saws constantly on hand. Orders filled promptly. **Dietrich's Double Hand Double Cross Cut Saw** made with any kind of tooth desired. Our patent method of grinding Hand Saws makes them superior to any in the market. Send for Illustrated Price List.

PUTNAM & CO. FORGED HORSE NAILS
PATRONS.
**Putnam's Government Standard
FORGED
HORSE SHOE NAILS.**

Manufactured from the best of **NORWAY** Iron, and warranted to give entire satisfaction.
S. S. PUTNAM & CO.,
NEPONSET, MASS.

**Rogers' Self-Sharpening
HOE.**

The best Hoe in market. It will not butter or break. Wears itself sharp. Will last twice as long as any other Hoe, and is warranted to cut the "Bolles Hoe" or any Hoe in market.
For Sale at Manufacturers' Prices by:
RUSSELL & ERWIN MFG. CO., - - New York.
BYRNE & FITZSIMONS, - - - Albany, N. Y.
KENNEDY, SPAULDING & CO., - - Syracuse, N. Y.

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Manufacturers of Warranted Cast Steel

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of every description,
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Mill, Hand, Roberts' and
other Wood Saws,
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Cast Steel Files

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Manufactured from
BEST NORWAY IRON,
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JAMES OHLEN
WARRANTED
PATENT ... GROUND
SECOND TO NONE
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I make a specialty of the **LARGEST SIZES** of Circular Saws, and call particular attention of lumber manufacturers to the following points of excellence:
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Properly Hammered.—Great care is taken that no saw shall leave my works without due attention in this important particular. A saw too tightly strained upon the rim, or too loose in the center, cannot be successfully run—hence the importance of so hammering the saw as to effect equal strain in all its parts, and at the same time **RUN TRUE**. This department is under the personal supervision of myself, who has devoted over twenty years to the art of saw making.
I am sole proprietor and manufacturer of the celebrated "**Challenge**" Cross-Cut Saw. Price Lists of all kinds of saws sent on application.
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Backus's Patent Bit Brace

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Salesroom, 82 Chambers St., N. Y.
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Also Manufactures the Straight Extension
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The socket is arranged so that the strain does not come on the jaws, but on the square hole which fits the shank of the bit. The jaws attached to the sleeve hold the bit firmly in the square, and center it true. The sweep is of wrought iron. The general finish of the stock is good. Its appearance is neat. Mechanics who have used it unanimously pronounce it superior to all others; and we offer it to the trade as the strongest, most simple, and quickest operating brace in the market. We manufacture five sizes. The number of inches of sweep corresponds with the commercial number of the bit.

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June 3, 1862; April 6, 1869;
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John Russell Cutlery Co.,

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TABLE CUTLERY,
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IN GREAT VARIETY.

Extra Hard Rubber Handle Table Cutlery of our own Manufacture.

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And the "Patent Ivory" or Celluloid Knife. These Handles never get loose, are not affected by hot water, and are the most durable knives known. Always call for the Trade Mark "MERIDEN CUTLERY COMPANY" on the blade. Warranted and sold by all dealers in Cutlery, and by the MERIDEN CUTLERY CO., 49 Chambers Street, New York.

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Manufacturers of

PATENT FINE PEN & POCKET CUTLERY
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The only Knives made that are put together in such a manner that there is no strain on the covering or frail part of the knife. We warrant our knives equal in cutting qualities and workmanship to any made, and are acknowledged by English makers as the Best American Knife. We also make

NICKEL & SILVER PLATED POCKET KNIVES

which will not rust or become discolored when used as a Fruit Knife, and their cutting qualities are equal to any other knife. Orders filled from the factory or by

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The most complete assortment in the U. S. of Shank, Socket Firmer, and Socket Framing Chisels.

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The American Ice Chisel



Is superseding all others. It will save your time, save your ice, save your refrigerator, save your money. It shaves more rapidly than a Crusher, and splits as true as a saw. The blade is of the best English Steel, carefully tempered and plated to prevent rust. Address orders,

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AMERICAN
PEN AND POCKET KNIVES,MANUFACTURED BY PEPPERELL,
AARON BURKINSHAW, MASSACHUSETTS

My Blades are forged from the best Cast Steel, and warranted. To me was awarded the GOLD MEDAL of the Connecticut State Agricultural Society; also a Medal and Diploma from the Mass. Mechanics' Ass'n Sept. 1868.

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AGENT FOR

WALTER SPENCER & CO.,
Steel and File Manufacturers,
Rotherham, ENGLAND.

Corporate Mark.



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Illustrated Catalogues sent on application.

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We would call the attention of jobbers to the necessity of sending orders early in the season for the

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Manufactured by W. T. & J. MERSERAU,
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Established in 1836.

Shelton Company,

Manufacturers of every variety of
TACKS & SMALL NAILS,
Carriage, Machine, Plow, Steel and
Tire Bolts, Coach Screws,
Bed Screws, &c.

BIRMINGHAM, CONN.

PHILADELPHIA CORRESPONDENCE.

PHILADELPHIA, March 15, 1875.

Whether either from the adjournment of Congress, the approach of spring, the opening of navigation, or all combined, certain it is that business is improving on all sides, and the feeling prevails of an active summer. The coal trouble continues, however, without any immediate prospect of settlement, and a most startling and infamous appeal to Legislative interference with the business interests of the State has been sprung upon the public during the week. This was a bill offered before our State Legislature entitled "An act for the adjustment and settlement of disputes between persons, partnerships, associations or corporations engaged in the mining of coal or the manufacture and production of iron or steel, and their employees; prescribing how such employees shall be paid, and the amount of coal that may be stocked and kept in reserve by any person, persons, partnership, association or corporation engaged in mining coal." The bill itself is too long for republication, as it fills some four or five columns of fine print. It is designated as Bill No. 478, and was first read by title February 26th, without attracting attention. For radical impudence, and communistic principles, it is equalled by no measure ever proposed to any legislative body of Americans. The provisions are substantially as follows: All persons, partnerships, associations and corporations engaged in mining and preparing coal, or in the manufacture and preparation of iron or steel for market, shall furnish, on the third Tuesday of every month, to the Secretary of Internal Affairs of the Commonwealth of Pennsylvania, to be filed in the Bureau of Industrial Statistics, a written detailed statement of their product during the previous month, with the price paid for mining or manufacturing same, and for transporting same to market, as also the price received for all sold during said month; the amount of money invested in the works and operations, the number of persons employed therein, and the wages and salaries paid to all such during the month. This statement must be sworn to, and provision is made for punishment for neglect. Any differences as to wages or other points between employers and laborers is to be adjusted and finally settled by a board of twelve persons over the age of twenty-one years, to be known as the Industrial Tribunal of Pennsylvania. This board is to be constituted of nine representatives of labor and two of capital, with the Secretary of State for the twelfth, to be drawn, as juries are, from names furnished from each district. Seven of this board are to form a quorum, and, besides adjusting differences, may declare wages rates for any period. Wages to be paid every two weeks, and it shall be a misdemeanor to pay in goods, wares or merchandise, or to offset same against wages. The Industrial Tribunal is also to fix the amount of coal to be mined, under penalty of taking possession of the mines. Such and similarly agrarian provisions comprise the rest of the bill, which has evidently been carefully and legally drawn by an able lawyer. Probably no similar document has yet seen the light, and its entire contents might be summed up in the communistic theorem that property is robbery. To listen to the reading of such a bill would be sufficient to cause the immediate withdrawal of all capital from industry. To attempt to enforce its provisions would cause a war which the whole military force of the country could not end. For the present the measure is defeated, but it is to be noted as an evidence of the radicalism and abundance of demagogues that a State Legislature may possess within its limits, that a number of members voted against laying it on the table. The only cure for such a spirit as is now rampant among the laboring classes, is to enact such laws as that now before the Legislature, protecting the employment of apprentices, and establishing industrial schools as a part of our public system of education. This latter subject was warmly urged by Gov. Hartranft in his last annual message, but the Legislature has entirely ignored it, and will adjourn without any attention to a matter of almost vital importance to the interests of this great Commonwealth.

The annual meeting of the Stockholders of the Pennsylvania Railroad was held during the week. The particulars of the report having been made public previously, the principal subject of discussion, which was animated, was the restriction of the powers of the managers, as recommended last fall by the investigating committee of stockholders. This gave rise to some sharp criticism of policy previously maintained, but resulted in a triumph for the administration and the nomination, subsequently, of the former Board of Directors, who will undoubtedly be elected this week.

The Pennsylvania shareholders have very little if anything to complain of in the management of their property. They have at their head the ablest railroad manager of the world, and a man whose principal ambition is to make his road and connections the leading corporation of the world. The directors are all men of record among their fellows, and no city is better served, or has its interests better protected than Philadelphia by the Pennsylvania Railroad under Thomas A. Scott. The Centennial Exhibition will bear abundant evidence of this to the world, while it will in turn serve to draw great additional revenue to the road most nearly and closely concerned in bringing foreign trade here.

The gossip of the week is rather slim. The rolling mills in Kensington are all busy on orders, and times are lively there. The near-by mills, not running on bars or stopped for want of fuel, are engaged in the now fashionable business of making muck bar for Pittsburgh. The ship yards are fairly busy. The new yard of Messrs. Holmes, Shaw, Brown & Co., at Bordentown, has two vessels under way, and is contracting for new work sufficient to keep them busy all the year. The Reading and Lehigh Railroad has been absorbed by the Reading R. R. Co., under a lease for ninety-nine years, and will be hereafter known as the "Berks and Lehigh Branch." This gives the Reading Road a direct communication with the Lehigh Valley coal field. The annual report of the American Steamship Line, shortly to be issued, will, it is said, show a falling off in trade for the last year of only \$10,000, while one of the leading European lines, from your city, has lost \$750,000 in the past twelve months. Four new steamers are also to be added. The Mauch Chunk Gazette has the following notice of a Fairbank's railroad track scale near there, which shows a wonderful record: "The 123 feet railroad track scale built at Packerton (one mile south of Mauch Chunk) in June, 1872, by Messrs. Fairbanks & Ewing, for the Lehigh Valley R. R. Co., has done more weighing for the scale than any other scale in the world. Its average weighing per day is over 20,000 tons for every day in the year, an annual tonnage of over 7,000,000 tons. A single day's (24 hours) weighing has often exceeded 60,000 tons. The scale has been subjected monthly to the severe "Goodwin test," and has always been found correct. Although over 18,000,000 tons have been weighed upon the scale it has never yet required repairs."

Cork as a Non-Conductor of Heat.

A company has been organized in Paris for the purpose of thoroughly testing the well-known remarkable non-conducting property of cork. It appears that a number of steam pipes at several important establishments, had been covered with this substance; but the test of continued application was wanting. More recently, however, it has been stated that after standing eighteen months, the cork covering has remained intact, and is as perfect a non-conductor as on the day it was laid. Although the durability of the substance had been proved before by the buoys, which are partly immersed and partly exposed to the weather, its being able to stand such high temperatures as those of surfaces heated by steam at from seven to eight atmospheres had not hitherto been shown.

Now, felt which is a good non-conductor of heat when first laid, deteriorates very rapidly; although retaining its original appearance, it ceases to be effective after a few weeks, and ultimately tumbles into dust.

A fear of the same result occurring in the case of cork would, no doubt, be entertained by those who are unacquainted with its nature, but not by those who know the composition of this remarkable wood-like substance. To set all misgivings at rest, however, nothing is so satisfactory as actual experience, and there is no doubt that cork is now firmly established as the non-conductor par excellence. Its lightness, the readiness with which it yields so as to surround the cylinders or pipes it may be destined to encase, the facility with which it is put in its place, taken down, and put up again in the case of an inspection or repairs to a boiler or steam pipe, and, above all, its non-conducting power, effecting so great a saving of fuel, assure for it the highest place in the eyes of all manufacturers who regard their own interests.

French naval engineers have made experiments on cork employed as a non-conductor, and have reported thereon to the Admiralty, which body has requested the manager of the company to appoint, at the five military ports, agents to attend to any orders which may be given. Their *cachet* given by men so reserved as the French naval engineers, at once places cork in the first rank as a non-conducting substance.

Security Against Seizure of Exhibits at the Centennial.—Director-General Goshorn has sent a cable telegram to Europe, contradicting the statement which lately appeared in certain German newspapers to the effect that, in case of the financial failure of the Exhibition enterprise, the goods of exhibitors would be liable to seizure. Mr. Goshorn's statement is fortified by an opinion of the Attorney-General of the United States, which removes all doubt on the subject.

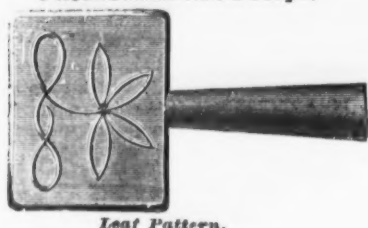
Failure of Coal Companies.—For several days past rumors of the failure of the Morris Run Coal Company, of Syracuse, and the Pittston and Elmira Coal Company, of Elmira, have been in circulation in Wall Street. It was generally conceded at the time that the companies were in a questionable condition, that their paper had gone to protest, and that their formal failure was inevitable. Some of the friends of the concern, however, thought that their failure was only temporary, and such a statement was made at the office of the New York State Loan and Trust Company in Wall Street. Yesterday, however, the following dispatch from Syracuse was received confirming the formal failure of both companies. The failure of Morris Run and Pittston and Elmira Coal Companies were announced to-day. Patrick Lynch, of Syracuse, is assignee of both companies. It is stated that the assets of Morris Run Company will more than meet liabilities, but some of the claimants are so pressing that the company deemed it best to make an assignment.

The Pittsburgh Commercial says: A project is on foot for supplying this city with gas from the Vandegrift well in Butler county, to supply the place of coal in our manufacturing. Engineer Davis was applied to Saturday for calculations regarding the cost, &c., and it is not improbable that ere long the immense quantity of gas now going to waste at this wonderful well will be utilized in such a way as to save not only a heavy expense to many of our manufacturers, but our citizens from much of the annoyance they now suffer from soot and smoke.

The Austin Powder Company's mills, located near the canal, five miles south of Cleveland, Ohio, blew up on Tuesday afternoon with a series of terrific explosions. The works, which consisted of ten or twelve buildings, were completely demolished, large fragments of timber and heavy machinery being thrown a considerable distance. There were eight or ten men at work in and about the mills at the time of the explosion, three of whom were killed, the others escaping with a few slight bruises. The two magazines, in which is stored a large quantity of powder, are situated about forty and eighty rods from the nearest exploded mill and did not explode, although the roof and wall of the nearest one was badly torn by the concussion. The loss to the powder company cannot now be ascertained, but will be heavy. The buildings, with the exception of the engine-house, were of little value. The extent of the damage to the machinery is not known. The cause of the explosion will probably never be known, as the man at the coining mill, where the first explosion occurred, was killed. In the immediate neighborhood of the explosion houses were badly damaged, windows being broken and plastering torn off. The wildest excitement prevailed, many believing the detonations were caused by an earthquake. Houses rocked and shook, and people ran into the streets. The damage in the city is estimated at from \$25,000 to \$30,000. An explosion occurred at these mills three years ago, but little damage was done to property, except that owned by the powder company.

H. D. SMITH & CO., PLANTSVILLE, CONN.

Patent Embossed Steps.



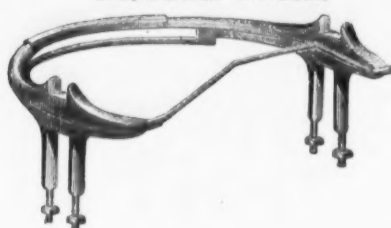
Leaf Pattern.

King Bolt Yokes.

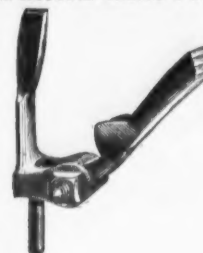


Established 1850.

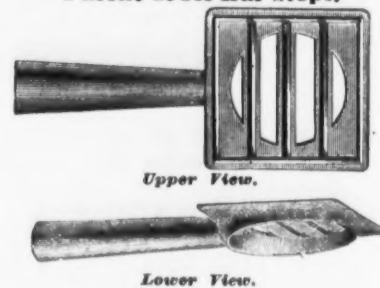
No. 6 Fifth Wheels.



1871 Pattern Shaft Couplings.



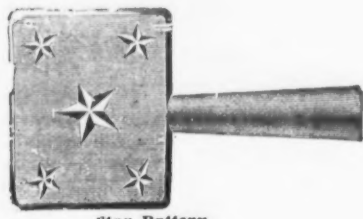
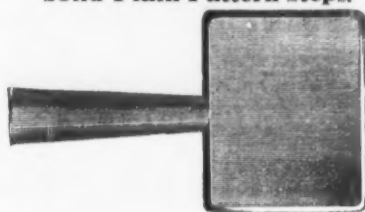
Patent Cross Bar Steps.



Upper View.

Lower View.

Solid Plain Pattern Steps.



Star Pattern.

Smith's Improved Philadelphia Pattern Slat Irons.



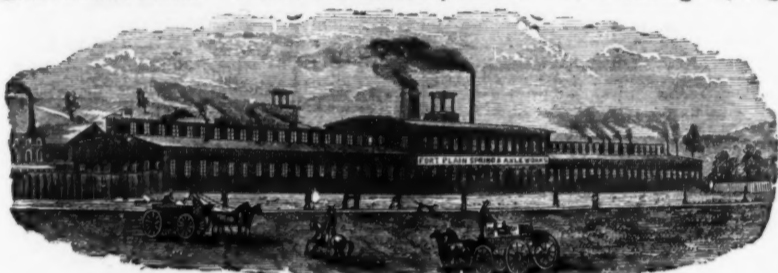
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Send for Price List.

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Green Jacket Axles. FORT PLAIN, N. Y. Fine Carriage Springs.



MANUFACTURERS OF

English and Swedes Steel Springs, and Iron and Steel Axles.

Execute orders promptly for

Black, Bright, Tempered and Oil Tempered Springs,
any Pattern or Style. Also for AXLES of any description, from a COMMON LOOSE
COLLAR to the FINEST OF STEEL.

Our facilities for manufacturing are very extensive, and with our recent additions of new and improved
machinery, we defy competition.
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CARRIAGE BOLTS.

Buy the Best.

Clark's Patent
Carriage Bolt.

Best Bolt manufactured for all kinds of agricultural machinery. Will not split the wood, and can not
turn in its place.

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Also Manufacturers of

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SOLID BOX VISES.

With or without Convex and Concave Washers.

Jack-screws, Braces, Coffee Mills, Turning Lathes, Clamp
Heads and Screws; Parallel Bench Vises, Sash Pullies, Ho
House Pullies, Composition Cocks, Bench Screws, Vise Screws
Gridirons, Drill Stocks and Bows, Box Chisels, Rivets,
Sheaves, Block Pins, Composition Roller and Iron Bushings,
Riggers' Screws, Caulkers' Tools, Pump Chambers, Belaying
Pins, Martin Spikes, Malleable Iron Castings, and General
Hardware.

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WILSON MFG. COMPANY,

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HOOPES & TOWNSEND,

Manufacturers of

MACHINE & CAR BOLTS,

Cold Punched Square & Hexagon Nuts,

Washers, Rivets, Wood or Lag Screws, Chain Links, Truck and Car Forgings,
Bridge Bolts, Bridge Forgings.

IRONS AND RODS FOR BUILDINGS.

1330 Buttonwood Street,

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CONCORD SPRING WORKS, J. PALMER & CO.,

Manufacturers of

CARRIAGE SPRINGS,

Superior Temper, Warranted.
CONCORD, N. H.

Philadelphia Star Bolt Works.

"STAR"

Carriage and Tire Bolts,

NORWAY IRON,
Button Head.

QUALITY GUARANTEED.



Trade Mark.

Carriage and Tire Bolts,
CHARCOAL IRON,
Beveled Head.

QUALITY UNSURPASSED.

The Celebrated "STAR" Brand of Axle Clips.

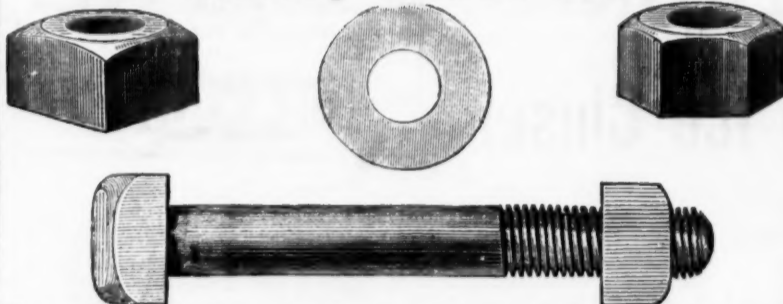
Blank Bolts, Wood Screws, Square Head Bolts, Plow Bolts, &c., &c.

Our I X L

Bolt is made from approved brands of Iron, and is equal in every
point of appearance to the regular Philadelphia Carriage Bolts, being made on the same machinery, and
the quality is not surpassed by any bolt of like grade in the market.

TOWNSEND WILSON & HUBBARD 2301 Cherry St. Philadelphia Pa.

Old Colony Rivet Works.



Rivets, Nuts, Washers, Lag Screws, Coleman's Eagle Carriage and
Tire Bolts, Axle Clips, Felloe Plates, Shaft Couplings, Stove
and Machine Bolts, Drilling Machines, Tire Benders,
&c. Full stock constantly on hand. Warehouse, 116 Chambers St., N. Y.



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Carriage, Tire & Square Head
Bolts.

Cold Pressed Nuts and Washers, Etc.,
YOUNGSTOWN, OHIO.

Price lists sent on application.



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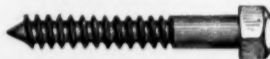
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READING PA.

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Machine Bolts, Bolt Ends,
RODS for Bridges & Buildings,
HOT PRESSED NUTS,

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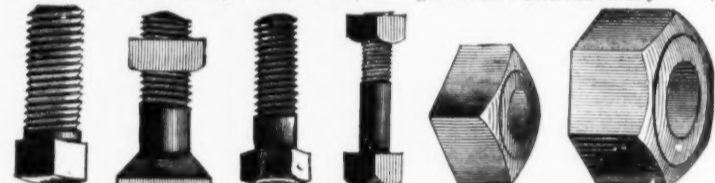
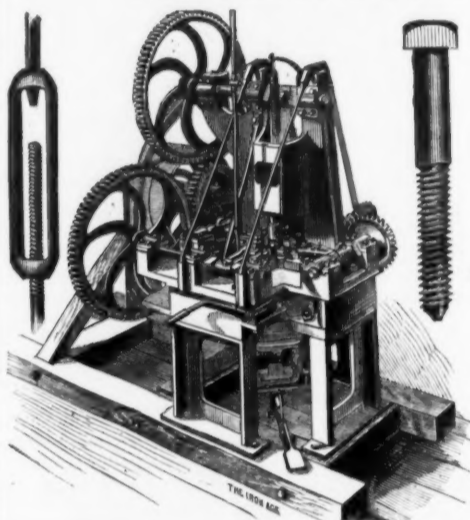
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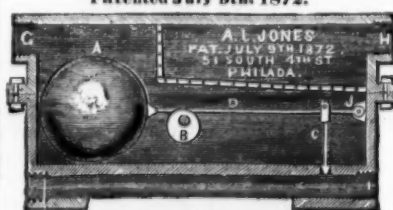
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New York, Thursday, March 18, 1875.

DAVID WILLIAMS - Publisher and Proprietor.

AMES C. BAYLES - Editor.

JOHN S. KING - Business Manager.

New York, January 2, 1875.
Until the 1st instant the postage on newspapers was paid by subscribers at the office where the paper was received, the yearly rates on the different editions of *The Iron Age* being as follows: Weekly, 40 cents; Semi-Monthly, 40 cents; Monthly, 24 cents. Under the provisions of the new postal law, which went into effect on the 1st instant, prepayment at the office of mailing is required, at the rate of two cents per pound for the Weekly, and three cents per pound for the Semi-Monthly and Monthly, which will make the postage as follows on the different editions: Weekly, 50 cents; Semi-Monthly, 30 cents; Monthly, 15 cents.

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The Policy of the Reading Railroad Company.

It is an unfortunate thing for the people of Pennsylvania that its great coal mining and carrying companies are practically beyond the reach of the people, and are in a position to bid open defiance to the popular will. Any legislation tending to restrict the powers or define the rights of the great corporations which monopolize the mining and carriage of anthracite coal, is promptly choked off; any attempts to investigate whether these great corporations have not assumed rights not accorded them in their charters, are suppressed at the outset; any expression of public discontent or dissatisfaction is regarded with

indifference. In a word, such a corporation as the Philadelphia and Reading Railroad is, practically, as independent of any interference with its policy of management, on the part of the people of Pennsylvania, as if it were laid on English soil.

For some years past that company has pursued a policy which all intelligent persons, especially local manufacturers, have regarded with apprehension and alarm. Controlling immense capital, it has steadily and successfully labored to absorb the business of mining, carrying and selling Schuylkill Valley anthracite, and the result has been the creation of a monopoly which, owing to the limited area of anthracite production, is, and must remain, absolute while it lasts. One by one the independent collieries have been absorbed, transportation has been refused to competing producers, and the Reading Railroad Company is now master of the situation, so far as the anthracite trade of the Schuylkill Valley is concerned. What is the result? Manufacturers on the line of the road, within forty miles of the mines, are compelled to pay \$4 for furnace coal and \$5.50 for steam coal, while the same company is selling identically the same coal for fifty cents less per ton in markets 400 miles distant, to which it is carried by rail and water. Before the railroad company monopolized the business of mining and selling coal, the market value of fuel was determined by competition among the operators; now consumers, at points to which there are no competing lines, are wholly at the mercy of the company, which exacts from them a higher price than is charged in distant markets to which coal is profitably carried. When, for any reason, an excuse is needed for maintaining or advancing the price of coal, a strike occurs just at the right time. The one now in progress, and which does not seem likely to soon terminate, is evidently satisfactory to the company. We do not say that the proposition to make the miners bear four-fifths of the proposed reduction of fifty cents per ton to consumers, was adopted with a view to inciting a strike, but we think we do the managers of the corporation no injustice in assuming that they are satisfied to have it continue for the present. No one believes that they could not work their mines to very nearly their capacity if they wanted to. There is in the mining districts an abundant supply of labor, which would gladly accept the wages refused by the strikers, but the societies exercise a control so absolute that, with such protection as is afforded them by the company, the non-society men dare not enter the mines. No one will believe that the State of Pennsylvania is unable to maintain peace and protect life and property within its borders. If the Reading Railroad Company honestly wanted to work its mines and keep its market supplied, there is no question as to whether the governor would sustain the local constabulary in suppressing riots and preventing bloodshed, even though the entire militia of the State had to be called upon. No such aid has been asked for, and the company await the issue of the strike with evident satisfaction, answering all complaints with the question: "How can we work the mines with an army of Molly Maguires ready to murder every man who should work except on the basis proposed by the society men?"

When an honest and sustained effort has been made to protect those who are willing to work for the wages offered, against those who are not, we shall accept with more confidence than now the specious plea of the Reading Railroad Company that it cannot adopt a policy contrary to the will of its idle miners.

In still another respect the policy of the company is calculated to excite grave apprehension. We refer to the course it has lately pursued toward the furnace and mill owners of the Schuylkill Valley. Some years ago it was given out that the company would assist the development of local industry by rendering pecuniary assistance to the projectors of iron works at points along the line of its road. This aid was accepted in a number of instances, and by this means the company acquired mortgages and liens upon iron plant to a very considerable value. Since the panic it has acquired possession of several establishments, mostly at prices very much below their value, by buying them in under foreclosure sales. This is, perhaps, a legitimate advantage enjoyed by capital; but looking a little closer we find much to support a suspicion that the company is attempting to carry out its policy of monopolizing the iron business of the Schuylkill Valley by means which are not legitimate. Some months ago the agents of the company approached the proprietors of furnaces then out of blast, and made propositions intended to encourage them to resume making iron. The promises were liberal, and apparently made in good faith. The company agreed to take all the iron made at the current market price, leaving the makers free to

sell it before or after delivering it to the railroad company if they could get a better price for it, on condition of returning the money paid them for such iron with interest at six per cent. per annum. In addition to this they were assured that they would be kept supplied with fuel. One or two collieries would be worked under any circumstances, and from thirty to sixty days' notice of strikes or suspensions likely to interrupt mining, was to be given. On the strength of these promises a number of furnaces blew in, only to find themselves betrayed. The company, after a few weeks, gave notice that they could take no more pig iron and make no more advances thereon, leaving those who could not sell their iron to pile it up around their stacks; and now coal is cut off, and the managers of the company profess themselves unable to do anything for the furnaces, most of which will have to blow out again. The probabilities are that some of the weaker furnace enterprises will be bankrupted by this experience, and between this and spring it is not unlikely that the Reading Railroad Company will have acquired several more cheap titles to furnaces which, in times of greater general prosperity, will be found valuable property. With these facts before us, it is not to be wondered at that the iron masters of the Schuylkill Valley should begin to suspect the railroad company of a desire to monopolize the business of iron manufacture along its entire line and branches.

For the evils which threaten the best interests of the State of Pennsylvania from such a monopoly as that of the Reading Railroad, we know of but one practicable remedy. The public interest demands that all railroads should be required to haul the cars of any forwarder or consumer who may have freights to move, over the whole or any part of their lines. The rate for such haulage should be fixed by law at a price profitable to the railroads, and yet low enough to enable forwarders who may choose to build cars to employ them profitably. This would at once give to coal lands owned by private individuals a value as great, in proportion to their extent, as those owned or controlled by the company, which could not then, as now, lock up all coal except its own by refusing cars in which to transport it. To require this of the railroad companies is only to protect the people of the State against the abuse of the valuable franchises granted to the companies, and to open the coal trade to free competition in the interest of the coal consumers of the State, who should have the advantage, in cheapness of fuel, of nearness to the sources of supply. We do not believe in legislative regulation of railroad management, nor in laws requiring the roads to do business at unprofitable rates; but the public interest overshadows all considerations of individual and corporate interest, and the latter should never stand in the way of a reform which the welfare of the whole community demands and renders necessary.

Iron Money.

We have probably heard the last of the kind of scrip which has passed under the general name of "iron money." By provision of the late act of Congress popularly known as the Little Tariff Bill, which went into effect February 8th, furnace scrip is taxed 10 per cent. upon the amount paid out. This practically taxes it out of existence, for no manufacturer could afford to pay such a tax, and, unless the law can be circumvented in some way, the furnace owners must dispense with the convenience of employing scrip in the adjustment of accounts.

For some reasons this action on the part of Congress is to be regretted, for others not. There have been times when these printed notes of hand, payable on demand in lawful money by the treasurers of the companies issuing them, have served a useful purpose as a circulating medium. This was especially true during the panic, when the banks locked up legal tenders, and where districts without adequate banking facilities were practically drained of currency. They have also served at times a very useful purpose as a medium of exchange between the servants of the companies and the tradesmen who, in the absence of currency, have taken these demand notes with confidence and have handled them as money. It is generally conceded, however, that while these notes have been a convenience, especially in the Northwest, there no longer exists a necessity for them great enough to justify their continuance in use, and a toleration of these issues of notes secured by nothing but the credit of companies which have, in some instances, uttered them for amounts beyond their capacity to redeem them in lawful money or bankable securities, might give rise to serious and far-reaching evils. Under the present law, national banking is made practically free,

and for many reasons which need not here be detailed, it is much better that a well secured currency should take the place of the iron money in those districts in which the latter has hitherto been the chief local circulating medium.

Heating and Ventilation.

It is no new truth to those who have studied the statistics of nations, that the abundance or scarcity of fuel in a country, and the extravagance or economy with which it is used, have much to do with both the intelligence, physical beauty and civilization of a people. This is a fact which we think can be made plain. In most countries of the world artificial heat is necessary, in order that a man may endure the climate without inconvenience. He must usually have a portable climate—that is, he surrounds himself with clothing by which the heat of the body is prevented from escaping. In addition to this, he uses fires to produce heat, and so keep up the proper temperature for the best action of the body. Human beings can endure great extremes of heat and cold. Dr. Kane and other explorers in Smith's Sound record 60° below zero, and even more—a degree of cold so intense that we can scarcely conceive the physical strain required to resist it. On the other hand, persons connected with establishments where drying rooms are kept at high temperatures, have breathed air heated 325° for five minutes at a time, and men have remained for some time in ovens in which meat was roasting beside them. Here is a range of some 385°, which the human body can stand for a limited time: 130° is about as high as a man can bear for any length of time, and do any work. So the range at which work can be performed is about 190°, or 200°.

In the intense cold, the whole energy of the system is necessarily directed toward supplying the heat of which the body is so rapidly robbed. In hot countries the intense heat hinders the functions to such an extent that man is weakened and cannot produce his best work, he becomes enervated and lives with the least possible exertion. Man's best mental and physical development can only take place in such a climate as is best adapted to his needs. So, in the olden times, before the art of warming and ventilating had received any attention, and before clothing was as well understood as in modern times, the best races were produced in such climates as those of Greece, Rome, Western Asia and Northern Africa. The climates were such that man did not need much clothing, and hence his physical and mental powers could be exerted with the least possible waste. As a matter of course, a fine race of people resulted. In the polar countries man is a miserable creature, below the average stature of the race, and spending his whole time in the struggle for existence. In England in ancient times, Buckinghamshire was well wooded, and had an abundance of fuel. These forests were in time, cut off to clear the country of the robbers, with which they were infested. The remote effect of this, which naturally made fuel scarce, was to dwarf the people and dull their wit. On the other hand, Sir Gilbert Blaine says that abundance of fuel, and its cheapness, in the county of Lancashire is extremely favorable to life, health and comfort; and he thinks that owing to this the people, especially the women, are noted for their fine forms and comely faces. This would be expected. No suffering is more effectual than cold and ill ventilation in deteriorating the human body, stunting its growth and preventing it from working freely and with ease. France has a better climate than Holland, yet, in the past century the inhabitants endured much privation from the want of fuel, and the average height of the men was only 5 feet 4 inches. In Holland it was 5 feet 6½ inches, and in England, with even then an abundance of coal, it was 5 feet 9 inches. In Sweden an abundance of cheap fuel gives a strong, hardy race in spite of a severe climate. But the northern races of men, even with abundant fuel, are always liable to fall a prey to diseases bred of foul air. The intense cold makes them dread ventilation, and consumptions and other forms of disease are easily engendered. Northern New England is famous for its consumptive tendencies, and these cannot fail in time to tell upon the physique of the race, unless greater attention is paid to the warming of sleeping rooms and the general ventilation of houses. To warm the whole house is necessary. People in passing from one room to another do not like to put on an extra garment, and yet the hall through which they have to pass may be as cold as the air outside. This produces a shock and a drain upon the vitality, and should be avoided. In the winter of 1867, in a northern New England town, the writer woke several mornings with the moisture from the breath frozen upon eyelashes and beard, and the pillow also frozen where the damp-

ness of the breath had condensed upon it. Such cold bedrooms cannot fail to seriously affect the health of the people. Ventilation in such a room is impossible; one can barely keep alive in so low a temperature, and to bring in colder air from outside would render freezing almost certain. Warmth, then, is absolutely necessary before we can think of anything else. The room must also be so arranged that the air may be kept pure. Years ago London was more healthy in winter than the surrounding country, which was attributable to the fact that cities are always warmer than the rural districts by several degrees, consequently there would be less suffering, better ventilation and less disease, other things being equal.

With these facts in mind, we at once come to understand how vitally important it is that our houses should be perfectly warmed and ventilated. In the more northern portions of the country the climate makes warming imperative, and people are not likely to suffer in the winter. In the Middle States the case is different. Winter lasts but a short time, and is too generally regarded as an exceptional season. The past winter was so regarded everywhere in this country, but we know that severe winters do occur at longer and shorter intervals, and it is for the extremes that a house should be prepared. Our warming apparatuses, as the rule, are altogether too small; every winter has days in which they are wholly deficient in power to keep our houses comfortable. The cold Sabbaths always find our churches uncomfortably chilly, and yet generally it will be found that more than enough fuel has been wasted to comfortably heat the building, had the proper apparatus been used. It is always to be remembered that a large fire burning slowly is much more economical than a small one burning rapidly, even when both consume an equal quantity of fuel in a given time. On the ground of economy, therefore, the best policy is to provide abundant means of heating, even in the coldest weather.

We call attention to these facts at this time for the reason that the spring season usually witnesses a considerable activity in building operations, and throughout the country architects and builders are maturing the plans of dwellings, churches, &c., to be built during the coming summer. To all such we would say: When you plan the arrangements for heating, base your calculations upon the use of furnaces which are large enough to warm a large volume of air to a moderate temperature, and which will comfortably heat your houses in the coldest weather which the climate of your locality permits, without requiring them to be driven beyond their capacity. In moderate weather such furnaces can be run very economically with less fires, and, if properly managed, need not overheat the house. In very cold weather more heat can be had by increasing the supply of fuel and promoting more rapid combustion, without necessitating the over heating of any part of the furnace. Pure air warmed by contact with a large heating surface, to a moderate temperature, is not vitiated—unless it has taken up gas from leaks in the furnace—and may be breathed without danger to health. Air heated by contact with the red hot heating surface of a furnace driven beyond its capacity is vitiated and poisoned, and cannot be breathed without danger to health. A small furnace overheated is dangerous in many ways. It vitiates the air passing through its flues, it is liable to overheat the flues and set fire to wood-work, it warps and twists out of shape, and is quickly burned out. It is, therefore, a mistaken economy, however considered, to put into a house a furnace which needs to be driven at any time to make heat enough to maintain a comfortable temperature. A furnace large enough to keep a house warm in the coldest weather without at any time being heated to redness in any part, is the cheapest, whatever its first cost as compared with smaller sizes. With large furnaces, moreover, we can have better ventilation than with small ones. If a large body of pure air of moderate temperature is poured into an apartment, more of the vitiated air can be expelled or drawn off than is possible when the inflow from the registers is small in volume and high in temperature. These remarks also apply to stoves. It is never profitable to buy a stove so small that a hot fire must be maintained in it to keep the apartment comfortable. A larger stove, intelligently managed, will be found more wholesome, more comfortable and more durable.

We have been asked for the address of Wm. A. Shaw, of New York, whose patent for an improved process of refining lead was published in our issue of February 4th. If any of our readers can tell us where the gentleman in question can be found, we will be under obligations.

An act is now pending in the Pennsylvania Legislature which has received very general and hearty approval from press and public. Its object is to protect children of the State in the right to learn useful trades, and declares unlawful all attempts to discourage or prevent children from learning trades or employees from engaging as many apprentices as they may have use for. This is a direct blow at a gross abuse. One of the worst and most wholly objectionable features of trade union control, is that the number of young men and boys who are permitted to learn trades is limited, in order that no competition may grow up which will deprive the mechanics who compose these unions of their present monopoly of skill and knowledge. In consequence of this exclusion of boys from the mechanical trades, a great majority of the rising generation are debarred from entering or acquiring a knowledge of them, and are driven to find a precarious support in the several branches of distributive industry which are already overcrowded. The selfish and cruel policy of the trade unions in this matter should be suppressed by the most stringent laws, and the public should insist upon the rigid and impartial enforcement of those laws for its own protection. The statistics of pauperism and crime show that a very large proportion of those who find their way into prisons and almshouses have no regular occupation. A man with a trade is pretty sure to be a useful, if not a moral, member of the community, and any attempt to prevent young men from learning trades, whatever the object sought to be accomplished by this means, tends to corrupt the public morals and to create paupers and criminals.

New Publications.

Transactions of the American Institute of Mining Engineers. Vol. II., May 1873 to February, 1874.

The bulk of this volume consists of papers read before the American Institute of Mining Engineers at meetings held between the dates given on the title page. Glancing over the contents we find many valuable treatises on mining and metallurgy, which will be found of great use for reference by all iron masters, metallurgists, and mining engineers. Among those who have contributed papers we find the names of many of our most intelligent and progressive metallurgists, whose views and experiences cannot fail to be of interest to all intelligent students of the same branches of science. The Transactions are printed by the Institute, and copies may be had by addressing Prof. Thos. M. Drown, Secretary, Lafayette College, Easton, Pa.

The Inexpediency of an Irredeemable Paper Currency, being an Abridgement of the Chapters from the Principles of Political Economy on Money and Credit, by John Stuart Mill. Price, 10 cents.

Our Currency: What It Is, and What It Should Be, by John G. Drew. Price, 20 cents.

We have here two little pamphlets, published by Henry L. Hinton & Co., 744 Broadway, and Henry Carey Baird, Philadelphia, which are evidently intended to aid in popularizing political economy. Mr. Mill's Principles of Political Economy is so well known that no comments upon a condensation of its chapters on money and credit are necessary. Mr. Drew's little pamphlet differs radically from the views expressed by Mr. Mill, and rather suffers by contrast when read in connection with its companion volume. We cannot approve its position nor accept its conclusions, but there are many who will indorse both.

We also have from Mr. Henry Carey Baird the announcement of a volume which will devote 374 pages to the advocacy of a system of finance which we do not think will ever be adopted—making greenbacks interchangeable with government bonds bearing a low rate of interest. It is entitled: "A New Monetary System; The only means of securing the respective rights of labor and property, and of protecting the public from financial revolutions," by Edward Kellogg. Unless this volume can show some better reason than has yet been advanced why the government should go into the business of paying interest on the unemployed money balances of the country, we do not think its reasoning will be conclusive or satisfactory.

Guaranteed Iron Ores.

EDWARD J. HALL, JR., Blast Furnace Engineer.

The quality of pig iron is determined so directly by that of the stock used, that it would seem absurd to expect a good and uniform product without carefully securing uniformly good stock; in numbers of works, however, this fundamental principle is apparently considered of but little practical importance. It is no wonder that, in view of this, so many furnace men consider it impossible to bring all operations strictly under control; that a big cast is good luck, and a poor run a "mysterious dispensation of Providence."

A very large number of unsuccessful blasts can be directly traced to this single cause—"poor stock." Thousands of dollars have been wasted in the fruitless endeavor to make good iron with combinations of stock which no amount of skill in the founder could possibly keep from turning out worthless metal.

An iron made from No. 2 ore may have, and generally does have, entirely different qualities from one made of the first grade. It is generally understood that in 1873, owing to the sudden and enormous demand, a very large amount of No. 2 stock found its way into the

market; the effect of this was to change entirely the product of many furnaces; for instance, stacks which had been producing first-class red short iron made neutral, and sometimes rank cold short metal. The evil results disturbed the mill men, because it disarranged all their established mixtures; one Pittsburgh mill which had been using five red short to four cold short, had to change to eight and one-half of the so-called red short and one-half cold short. At that time the evil was so marked as to attract general attention, but its present extent is totally unappreciated. What may be called the large factor of safety in blast furnace operations, conceals the effects of a vast amount of bad materials and blundering practice; the fatal result is, nevertheless, sure to creep into the balance sheet, and, although the cause may not be directly apparent, in many cases it would be neither hard to find nor difficult to remedy.

If the quality of ore changes without the founder's knowledge, he is working entirely in the dark, and will waste a hundred times the cost of accurate analysis in experimental efforts to obtain good results. For instance, an ore is bought on the supposition that its analysis is as follows:

Peroxide of iron.....	75.30
" manganese.....	0.15
Alumina.....	1.69
Lime.....	7.04
Magnesia.....	0.94
Silica.....	10.13
Carbonic acid.....	5.41
Phosphorus.....	none
Sulphur.....	0.03

Metallic iron..... 100.68
52.71

Its treatment in the furnace is based on this, but, after a time, an analysis of the ore actually delivered gives this result:

Peroxide of iron.....	66.08
" manganese.....	2.44
Alumina.....	7.29
Lime.....	0.47
Magnesia.....	23.00
Silica.....	0.65
Carbonic acid.....	none
Phosphorus.....	0.21
Sulphur.....	0.21

Metallic iron..... 100.11
46.24

Here is a very serious loss to the purchaser in a deficiency of more than 6 per cent. of iron, and an injurious excess of 13 per cent. of silica, with no increase of compensating ingredients. It is clearly manifest that any calculations based on the first analysis would be entirely worthless in determining proper mixtures to secure a given result. In another case a so-called No. 1 Lake Superior ore analyzed less than 55 per cent. of iron, and contained considerably over 30 per cent. of silica.

More than 50 years ago a foreign writer very pertinently said on this subject:

"I would here call attention to the exceedingly uncertain and deceptive nature, not only of many of the preceding, but of nearly the whole of the following minerals (many of which, to the eye, as well as from their specific gravities—which points I have discarded as criterions by no means to be depended upon—would indicate that a fair amount of iron may be expected from them), were not only perfectly valueless as iron making materials, but would have proved excessively injurious in the smelting furnaces; for had not these analyses been attended to, there is not the slightest doubt but thousands of tons of such worthless materials would have been introduced into blast furnaces, whereby would have been inflicted an incalculable loss upon the proprietors of iron works, not only from paying a comparatively large amount of money for such minerals in the first instance, but from the prodigious damage that would have been done to good materials—probably to fifty times their first cost. Surely there is no rule or reason why an iron master should not avail himself of all possible scientific means in aid of his great undertaking, equally with those parties who engage in copper smelting. These gentlemen will never buy a pound of ore until its yield has been accurately ascertained; and I hope to see the time when iron smelters will rigidly follow so good an example. By placing the iron ore trade on this system, a complete certainty would very soon be arrived at that would add much to the convenience and benefit of the managers of iron making establishments, and, at the same time, secure to the sellers and getters of ores the full value of their several commodities, and a good and constant demand also—at least, for all ores really worth having; but all impositions and deceptions in the matter, whether designedly or otherwise attempted, would here be brought to an immediate and final end. "Deceptions" which (although, in the majority of cases, no doubt unintentional) have cost, and will again, if a more general appeal to scientific examinations be not adopted with respect to the working value of iron ore, countless thousands of pounds in money and vexations and disappointments, in a manner, without end."

He then gives some sixty analyses, many of which show less than 5 per cent. of iron. It seems almost incredible that such stuff should be bought and sold as iron ore, but I know of a similar case which occurred less than five years ago. An ore for which a high price was paid proved to be absolutely nothing but limestone, tinged with peroxide of iron; still, its external appearance would have deceived most furnace men. In this case the purchaser found himself entirely without any remedy, and the so-called iron ore was finally worked up as a substitute for limestone.

There is another side to this matter, and the loss, though generally, is not always with the furnace owners; an ore which was supposed to yield about 40 per cent., and was purchased on that basis, afterward yielded nearly fifteen per cent. more.

A system in which such mistakes (or swindles) are possible, is, on a larger scale, an exact counterpart of the school-boy transaction of swopping jack-knives "inside unseen."

If the published reports of new ore discoveries are to be believed, we must conclude that

60 per cent. ores (occasionally they run up to 80 per cent.) containing no injurious substances, are to be found in abundance in almost every State. Generally these accounts are based on analysis by strictly honorable chemists, and these analysis really represent the exact character of the samples presented to them; but sometimes the analyst gives a report which is, in his opinion, best calculated to please his employer. In either case not one in ten of the mine owners would guarantee deliveries of large quantities up to the published standard; still they use this false valuation in determining the selling price. It is clearly in the interest of furnace owners to have all contracts based on a distinct agreement as to quality in all the constituents of their ores. The owners of really good mines would be just as materially benefited, because the price of their products would not be "cut" by the vendors of rubbish. A good article would be sure of a fair price, while worthless stuff would find no market except with the old rule-of-thumb men.

Furnace operations would be largely simplified, the product would be more easily controlled, and results far more certain. It is to be expected that the change will meet with opposition from the owners of doubtful mines, but it is certain to come, and, in fact, some works are now adopting a very similar plan. The great question now is to secure the best plan for obtaining suitable guarantees, and then to bring about its general adoption. A free discussion of the subject by both parties through the trade journals, or in their associations, would throw a vast amount of light on it, and do much to secure a just and equitable arrangement. It seems impossible to establish any arbitrary standard which shall be universal in its application, for the reason that the points of excellence vary so much in the different kinds of pig iron. What constitutes a No. 1 ore must be determined more by the requirements of individual consumers than by any combination of manufacturers or miners. But while each establishment fixes its own standard, and determines its application, it is imperatively necessary to have a sound, general basis from which to calculate all values; this, basis, it seems to me, can only be accurate chemical analysis; that is exact, unfeeling and universally applicable.

A gentleman who noticed the difference between his analyses and his stock book, said: "I do not care what my ores will analyze, I want to know what they will yield in the furnace." He thought that the ore companies should guarantee the per cent. of yield in the furnace. In this case the lack of correspondence between analysis and practice, was due either to incorrect analytical work, or a failure on the part of the miners to deliver the sample quality of ore. There should have been hardly any variation; indeed, with soft gray iron the yield should apparently exceed that required by analysis, owing to the presence of foreign substances in the pig. If it fall much below, either the analysis is incorrect or the management faulty. To require a guarantee of yield in the furnace would be unfair for both sides. Sometimes a great deal of stock is wasted, and then the ore companies would lose unjustly, while at another the yield of iron might be good, when a change in other constituents rendered the ore almost valueless. Such tests are uncertain always, particularly so when several varieties of ore are used, and the method is, at best, a crude and unsatisfactory way of estimating values which depend on so many more qualities than the yield of iron. Then, too, a settlement of accounts would necessarily be deferred until the ore had been used, and in case of any controversy as to its value the only unanswerable witness—the ore itself—would be gone, and endless confusion and litigation would ensue.

The most exact and satisfactory way would be to have the ore dealer furnish an analysis which he guaranteed to represent the exact character of ore to be delivered, the per cent. of iron being the least, and of impurities the greatest allowable. From time to time, during delivery, the furnace company must ascertain the quality arriving, and in case it fall below the given standard, the ore dealer must be at once notified, and the value of the lot determined by agreement or expert arbitration, the whole expense being born by the party in fault. If the furnace company fail to make the analysis, or to report at once any failure in quality, the ore shall be paid for at the standard valuation. If, when notified, the ore dealer does not give the matter such prompt attention as shall be beforehand agreed upon as reasonable, he shall settle on the basis of the furnace company's report.

This system at first sight may seem a little expensive and troublesome, but the ore companies would seldom fail to secure such thorough inspection at the mines as to avoid all difficulty with purchasers, and in any event it will be found far less costly to pay for a few analyses than to give, as is often done, from 10 to 50 per cent. more for ore than it is worth; the trouble is nothing in comparison with the damage inflicted on furnaces and business by an occasional run of poor stock.

American and British Patent Law Reform.

The state of its industrial arts is the truest index to the civilization of any people. For it is through these that humanity adjusts itself to the conditions of existence by bringing itself more and more into accordance with those laws of the infinite, by which all mental, moral and physical development is regulated and controlled. And that nation most progress most and fastest in which the popular intellect is the most active in discovering new applications of

*Paper read before the Polytechnic Association of the American Institute, Thursday evening, March 11th, 1875, by James A. Whitney.

natural forces in aiding or supplanting the labor of human hands. To secure this activity an appeal must be made to the self interest of the individuals who compose the mass, and this appeal must be made in such wise as to reward the individual for every contribution to the common advancement, otherwise he will have no incentive to exertion and will make no effort. In the middle ages, and in remote times as well, the favoritism of princes gave fitful encouragement to inventions of new arts, or to skilled operators in those well known, and this encouragement often took the form of a special privilege, sometimes of an exclusive right to practice the improvement, and it was in this manner, at a date so remote and under circumstances so uncertain that neither time nor land can be given, the practice of granting patents for useful inventions was initiated. These privileges were by special grant and favor of the king, but in 1623 the enactment of the famous statute of monopolies by the Parliament of Great Britain expressly recognized the issue of patents for inventions on the grounds of public policy, and the courts of England adjudicating actions of infringements upon patents thus issued, settled in definite form the ethical and legal basis of such grants. They held that the issue of a patent was in the nature of a contract between the public and the patentee. The public, needing inventions, offers to pay for them by a monopoly of their use and sale during a limited period. If the invention is useless the patent is void, because the patentee has given no valuable consideration for it. If his patent is too obscure to enable his invention to be understood, or if it claims more than he has invented, or if it contains other errors or misrepresentations that seriously mislead, it is void, like any other contract under the same conditions, on the ground of fraudulent suggestion. The system of granting patents, therefore, is based upon these four propositions that grow out one from another. Society needs new and useful improvements in the arts and industries; in order to obtain them it must and should pay for them. The easiest and most just method of payment is to allow the inventor an exclusive right to make all he can from his improvement during a limited time, the reward being thus made dependent upon the merit of the invention and the efforts of the inventor to make its advantages known to the public. The patent being in the nature of a contract, holds the public and the patentee to mutual good faith, the one to protect the inventor within the limits of his grant, the other to make his invention as beneficial to the public as possible; firstly, by working it for his own profit during the term of his patent; and, secondly, by throwing it open to the public in its perfected and working form at the end of its term. These simple propositions embodied in tangible formulas, and enacted into positive law, have been the inciting cause of the industrial progress of the past two hundred and fifty years. The founders of the system, building wiser than they knew, succeeded in putting into practical operation a branch of law that has well been termed the metaphysics of jurisprudence, for the purpose of promoting the commonest arts of life. They did it by basing the interests of the concrete man as embodied in the state, upon the interests and aspirations of the individual, and pledging the authority of the one to protect the efforts of the other. The result has been that, during these two centuries and a half, the Anglo-Saxon race has been a race of inventors, of mechanicians and manufacturers, of chemists and engineers, and to this more than all else has Great Britain owed her dominance in war and her supremacy in commerce; to this more than to all else our own people owe the rapidity with which they have covered a continent with tillage and manufactures, and passed scatheless and unharmed through the vicissitudes of revolution. Said Napoleon at St. Helena, "England conquered me not by her arms but by her spindles, for with these she subsidized all Europe." But these spindles would never have fought their way against the clamor of ignorant times, and proved their value in the factories of Britain, had not Arkwright's patent of 1769 incited him to overcome all difficulties by the promise and hope of reward. And it may be said as well of inventors of the engine that drove the spindles, the loom that wove the yarn into fabrics, and even of the metal of which spindle and engine were made. For James Watt would have failed, had not Boulton been induced by a share in his patent to carry the experiments to completion, and demonstrate the cheap and effective use of steam as a motive power; and Cartwright aimed at securing the patent of which he was afterward defrauded, even before he had brought his weaving machines to perfection; and the patents of Dudley, who, in 1621, first successfully made iron from "pit coal" instead of charcoal, of Prince Rupert, who, in 1670, had an improved process of converting iron into steel; of Cort, who, in 1784, invented the process of puddling, show that these men were urged to their efforts by the promise of substantial financial profit, and not by an empty desire for praise. Why do I illustrate by these examples (drawn from among scores of others) the truth that inventions are beneficial to the State, and that it is through, and only through, the enactment of patent laws that such inventions will be made? I do it as preliminary to a consideration of British patent law reform; because Sir William Armstrong, who has acquired rank and fortune through patents on inventions that he never made, has denied the first clause of this proposition, and Mr. MacTie, a member of Parliament, has earned a cheap notoriety by denying the second, and to these two men, more than to all others, is due an agitation of the British patent question that seeks to nullify a system that, just to the inventor and just to the public, has led mechanicians of England to exert themselves

to the utmost to build up her industrial wealth, and the commerce that is based thereon. Here, in America, the issue of letters patent for inventions based upon the same ethical principles as in England, has been equally marked in its results. Eli Whitney would have thrown the cotton gin into the scrap heap, had not his patent offered the promise of return for his outlay. John Fitch would never have persevered until he had demonstrated the practicability of steam navigation, had it not been for the patent he held from the State of Pennsylvania; nor would Robert Fulton have succeeded had not Chancellor Livingston been lured to his aid by the advantages of a patent from the State of New York. In the introduction of an improvement, no matter how meritorious it may be, there are always old prejudices to overcome, old usages to be disturbed, many experiments to be made, and an outlay, often excessive, to be incurred in establishing the manufacture. In a majority of instances, the inventor has not the capital to accomplish all this, and must seek the assistance of those who have. Who would venture their assistance if no chance of its return were available, and no chance is available except by means of a patent. Even if the inventor always possessed the requisite means, would he be justified in their expenditure if, after all the cost of developing an invention and proving its usefulness, others could step in and appropriate the experience and skill displayed in the invention, and the money embraced in its perfection, to which they had contributed nothing. No man will sow, knowing that another will reap, and no inventor will invent and no capitalist will develop an invention, if he is taught that he shall not gain thereby. This truth, that patents should be granted on grounds of public policy as well as of ethical justice merits full stress at the present time when, in this country as well as in England, a misunderstanding of their true nature is leading to something of a feeling inimical to them. There is, indeed, no department of industry, no branch of science, no comfort of the household, no aid to the farmer, no tool of the workshop, no luxury that adds to the enjoyment of life, but has been fostered by the patent laws, and in ninety-nine times in a hundred been indirectly produced thereby. The sewing machine would never have found capital for its improvement, manufacture and sale had it not been for the promise of profit held out by the patents thereon, and who will deny the benefits it has conferred upon the world? upon the poor even more than upon the rich. The electric telegraph would never have passed beyond an experiment had not Professor Morse's patent enabled him to sell fractions of his invention for means to perfect it. Without patent laws we would have had no harvesters for grass and grain, for the patent law led hundreds of ingenious men to strive year after year to produce a practical reaper and mower, until at last, from among a thousand failures, there sprang the dozen practical improvements that multiplied ten-fold for all lands and all times the power of the laborer's arm in the hay and harvest field. And only a dozen years ago, when the war sifted the strongest from farm and village, the harvests would have crinkled uncut to the ground had it not been for machines that would have had no existence had it not been for patents, and a remark of like meaning applies to the seeding and planting machines used in the prairies of the West, by which horses are made to multiply manifold the work of men. Indeed, no stronger illustration of the bearing of patent laws upon the welfare and power of a people can be found than is afforded by the contrast between the Northern and Southern States previous to the war. The North had appreciated and encouraged patents. Patents had built up manufactures and improved agriculture, and as a result the improvement of industries had led to production of wealth to well tilled farms, to great cities, and innumerable thrifty and populous villages. In the South patents were disregarded, the mechanical arts were ignored, the population was scattered, the cities entrepôts for the transshipment of staples, the villages sparse in people and far between. No lustre of statesmanship, no ardor of hope, no sincerity of purpose, no heroism in battle could make up for the fatal error of disregarding the power which industrial art adds to the resources of nations, and the result only showed what all history had shown before, that success in war rests upon the arts of peace, that the anvil and sickle must uphold the sword.

So much then for the utility of patent laws; they cradled the arts in their infancy, they bore them up in their struggling youth, they are urging them onward to new triumphs in their buoyant manhood, they hold out at once the incentive and the promise of a progress in the future of which the world as yet but dimly dreams. Thus the first question sprung in all discussions of change or reform in the patent laws, whether they are truly a benefit to the public, is fully answered by the experience of the race that first gave them the form and the force of statute law, and which has tried them the longest and most thoroughly. And now let us pass from this consideration of the nature and results of patent laws *per se* to that of the changes required in American and English laws and methods of procedures in order to fit them more completely to the requirements of the times and to insure their most effective working.

(To be continued.)

A machine of the torpedo class has been constructed by the British navy which will move at a speed of nine knots an hour for 300 yards, and at a slower speed for a mile. It will maintain any direction impressed upon it, and it can be launched either from a boat or an iron clad, by night or by day. In short, it is a kind of explosive fish, which, in obedience to its masters, will swim for a mile toward any adversary, at which it may be directed, and will strike a dangerous blow.

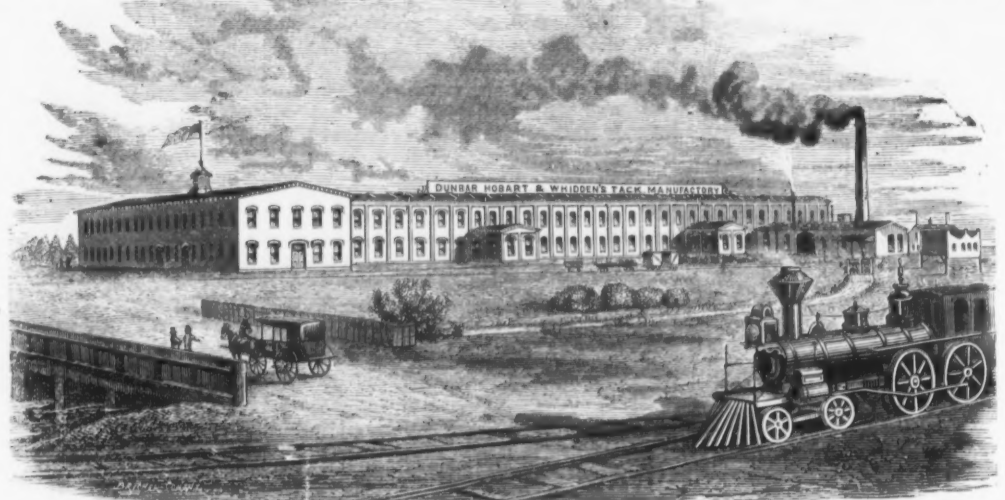
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Sanitary House Drainage.

The following paper was read before the Public Health Association, of New York, at the School of Mines, Columbia College, Thursday evening, March 11th, by Mr. James C. Bayles, Editor of *The Iron Age*.

MR. CHAIRMAN AND GENTLEMEN:—I shall have the pleasure this evening of presenting for your consideration a few facts and suggestions relating to the subject of house drainage, as regarded from a sanitary point of view. My remarks will be limited to the drainage of houses provided with more or less complete systems of service, waste and soil pipes, with water closets, and with sufficient water for flushing—which includes a very large proportion of the dwellings within our city limits.

HOUSE DRAINAGE THE CONSUMMATION OF HYDRAULIC ENGINEERING.

A well devised and well executed system of plumbing work in a house, with its pipes for distributing water and carrying off all liquid refuse, its water closets, baths, &c., is the crowning point of a vast system of hydraulic engineering, which is the outgrowth of a high and regularly developed civilization. Great aqueducts, costly and capacious reservoirs, hundreds of miles of mains and thousands of miles of distributing pipes, great and costly systems of sewers and networks of metal tubing, are all necessary. In every part, the work which precedes the introduction of water into a city dwelling must be well done, at great expense to the public, by accomplished engineers. Nothing can be slighted or neglected, and every detail of the great system must be as perfect as possible to meet the public necessities and satisfy the public expectation. And yet, how often do we find that the work of connecting our houses with the pure water supply, on the one hand, and the sewers on the other, is done so carelessly, with apparatus so imperfect, and with so little regard to sanitary laws on the part of the plumber and those who employ him, that the tenant of the average city house would be better off if the great engineering works undertaken to render house drainage possible had never been consummated. As the rule, though not invariably, as I shall show, the fault is less with the mechanical workmanship than with the defective character of the arrangements employed. A mistaken economy, which seeks to reduce the cost of internal fittings, that the more may remain for external and internal ornamentation, often forces the contracting plumber to neglect the many precautions against the inflow of sewer gas which his experience has taught him are essential to health. Let the blame rest where it properly belongs. So long as people who live in houses neither know nor care whether the plumbing work is well done or not, provided their walls are not stained by leakage from the pipes or tanks, nor their nostrils offended by foul odors from known and easily discovered sources, so long will contracting builders demand cheap work from the plumbers, and the plumbers furnish it. The only means of guarding against serious danger to the public health from this cause, beyond what little the Board of Health can do in this direction, is in keeping the subject before the public until, by impressing the intelligent reading classes with its importance, we can secure attention to such recommendations as we may have to offer.

POPULAR INDIFFERENCE TO SANITARY SCIENCE.

The indifference manifested by people in all classes of society with regard to the Department of Sanitary Science which deals with house drainage, is, I think, attributable to popular ignorance. Comparatively few people know what sewer gas is, and those who have been connected with the corps of city sanitary inspectors have, doubtless, found that a majority of people believe there is a great deal more talk about it among those who claim to be scientific sanitarians than its importance really warrants. This is a serious mistake, which cannot fail to imperil the public health by giving rise to a false sense of security, and encouraging the toleration of dangerous nuisances. The experience of centuries has taught that the gases generated in sewers are dangerous to health. These are chiefly carbonic acid, nitrogen, sulphureted hydrogen, ammoniacal compounds and foetid organic vapor. Of these hydrogen is the least formidable, although it will not support animal life. Carbonic acid is too well known to need description; sulphureted hydrogen is, I believe, one of the most poisonous gases of known composition; and the foetid organic vapor, concerning which but little can be definitely known, is probably the most dangerous, because most subtle, of all the emanations from decomposing sewage. In well ventilated sewers, analysis shows the presence of carbonic acid, nitrogen, sulphureted hydrogen and traces of the other gases mentioned; but the sewers of New York are not well ventilated. Indeed, as I shall show presently, they are much of the time with no ventilation at all, consequently we may expect to find in them a rare combination of foul gases. Probably the only thing that saves us from a continuous epidemic of typhoid fever, is the fact that our sewage is more diluted with water, in proportion to its volume, than that of any other large city. In the use of water we are extravagant to a degree unknown in any part of Europe, and to this fact I think we may owe such immunity as we have thus far enjoyed from the consequences of our neglect of the proper ventilation of our sewers. Owing to this dilution of our sewage, it is probable that less gas is generated in proportion to the volume of flow than in cities where more attention has been given to this subject; but it is none the less desirable to keep the air of our unventilated sewers from mingling with that of our dwellings. To show how this may be done most economically and effectually, is the object of this paper.

WATER CLOSETS.

When any defects exist in the plumbing system of a house, by which sewer gas can force an inlet, they are usually found most conspicuous in the arrangements of the water closets. It is, therefore, proper that we should direct our notice first to these, as they are the most likely to need the attention of the sanitarian. The requirements of a good water closet are various and imperative. It must be inodorous; it must be so constructed that it can be effectively flushed with a minimum quantity of water; it must be so simple in construction that it is not liable to get out of order in any part, and whatever passes its trap must be effectually prevented from returning in any form. The water closets in common use, however, do not meet these requirements, and it is no exaggeration to say that, when introduced into a house, they are a nuisance and a danger, instead of being a convenience and luxury. From inquiry and observation, I find that the device known as the pan closet is the one most generally used in the inside of New York dwelling houses, while hopper closets, with spring valve flushing apparatus, are chiefly employed in manufacturing and public buildings, and in out-door closets connected with dwelling houses. The common pan closet is probably one of the most objectionable in use. Its construction is so well known that only a brief description will be needed to show its defects. In the drawing marked Fig. 1, B is the basin, usually made of earthenware; P the pan which is tilted by raising the handle; R is the receiver, in

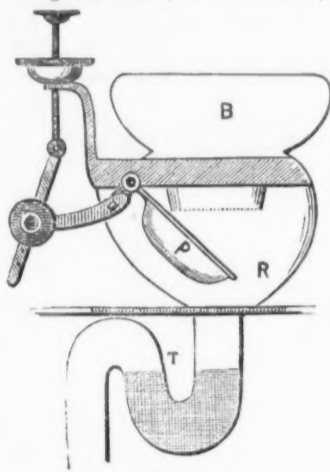


Fig. 1.

which the contents of the pan are deposited when the handle is raised, and T is the trap. The principal objection to this form of closet is that the side of the receiver against which the pan delivers its contents when tilted, becomes coated with a mass of foul matter which clings to and cakes upon it. I have known instances, occurring under my immediate notice, in which it was necessary to remove the receiver every few months and burn it out, in order to abate for a time the stench, which gradually increased until it became intolerable. The gases generated between the two traps are liberated whenever the pan is tilted, and if this is not frequently done, they make their way through the water in the basin. The defects of this system cannot be effectually remedied by ventilating the receiver, although this may abate the nuisance in a marked degree.

The hopper closet, of which the common type is shown in the drawing marked Fig. 2, is

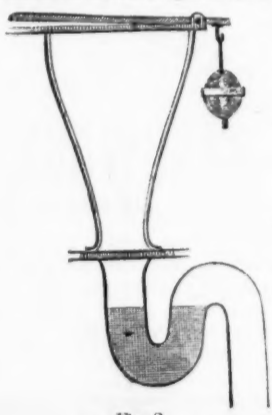


Fig. 2.

better in many respects than the pan closet, and if abundantly and frequently flushed, it is free from any grave objection; but, as the rule, hopper closets are not properly flushed. In most instances a flow, small in volume and without force, is maintained by an arrangement which holds the valve partly open when the closet is in use, but this is seldom sufficient to carry fecal matter out of the trap. The pan closets, however, are the ones which especially invite our attention, as they are the ones from which most is to be feared, and against which every physician should utter his protest. If tolerated at all they should receive constant and intelligent attention, and every precaution should be taken to secure a constant and perfect ventilation of the apartment in which they are placed. There is no danger of our being too careful. How little they are feared, however, even by intelligent and well informed people, may well occasion surprise. I know of a house in this city, occupied by an eminent consulting physician, in which the water closets are the worst I ever saw. They are pan closets of the most objectionable kind, placed in dark pantries with absolutely no ventilation, except such as is afforded through the doors opening into the halls, and through windows about the size of a sheet of commercial note paper, opening into adjoining apartments. If intelligent physicians are satisfied with such arrangements as this in the houses they occupy, what can we expect of the general public?

While upon this subject, I may say that it is possible for any one who wants a good water

closet, to get one as free from objections as such an apparatus can be made by the combined study and experience of eminent sanitarians. I do not describe them for two reasons: I have not time, and I do not wish to make any invidious distinctions. I will only say, therefore, that there are water closets in the market, of English and American invention, against which no reasonable objection can be urged, when properly connected with the service and soil pipes. Every intelligent plumber knows which they are, and will provide one if desired to do so. The closet which, from a sanitary point of view, I consider most perfect, is the ship water closet, which, with some modifications, would be a valuable improvement upon anything now in use in dwellings. This is a pump closet, in which a force pump removes everything from the hopper, and forces it out of the soil pipe. These closets are made for use below the water line, so their action has to be made positive, while they are absolutely water and air tight. As applied to vessels, they are quite expensive, but if they could be modified for household use, or a similar apparatus be introduced, there is reason to think that a great benefit to health would result from their employment.

CONNECTING WATER CLOSETS WITH SOIL PIPES.

The manner in which a water closet is connected with the soil pipe is of great importance. The plumber is often responsible for the offensiveness and unwholesomeness of water closets, which, had his work been properly done, would have given little or no trouble. The only effective means of diminishing the danger of an escape of sewer gas into a house, is to afford it an easier means of getting out than through the water in the traps, by ventilating the soil pipe. In common work this pipe generally ends in the highest water closet or wash basin in the house. To prevent the gases from escaping dependence is placed on the traps, the common argument being that the express purpose of the trap is to prevent the escape of gas and foul odors, and if other means are provided they will be superfluous. This argument is based upon an evident misunderstanding of the conditions which sometimes exist in our sewers. In this city there are periods, sometimes several weeks in duration, when, so far as I can learn, our sewers are absolutely without ventilation, and when the only escape for gases, which are often held under considerable pressure, is through soil and waste pipes. Our chief dependence for sewer ventilation is upon the perforations in the manhole covers. These are better than no openings at all, when they are open, but they are liable—almost certain, indeed—to become choked with mud and dust during much of the time, and from the first snow fall of winter until spring—with perhaps a few brief intervals of general thaw—they are as effectually closed by ice and snow as they would be if covered over with the permanent pavement of the street. The culverts at the street corners are, of course, trapped, and during the winter season they are effectually sealed, if such a thing is possible under any circumstances. The mouths of the sewers are, as the rule, so placed as to be completely submerged at high tide, at which times the river water forces its way up into them for a considerable distance, compressing the air confined within in proportion to the resistance offered at the various outlets by which it makes its escape. To increase this pressure we have still another active agent—heat. In cold or cool weather the temperature of the air in our sewers is usually considerably above that of the outer air. We are continually pouring great floods of hot water into them at temperatures ranging from 80° to 180° Fahrenheit. It is not unusual to allow steam engines to exhaust into them, and as showing that the temperature of the confined air of sewers is not low enough in average weather to condense steam, I may instance what we have all seen—the escape of steam, still a hot vapor, from the perforations in manhole covers, in regular puffs corresponding to the piston strokes of an engine in some neighboring building. In one way or another we impart a great deal of heat to our sewage, and, under conditions by no means uncommon, this heat is capable of exerting a power so great that no common trap could effectually oppose it. A simple experiment, which I find described in Latham's "Sanitary Engineering," will serve to show how heat exerts its power by increasing the pressure of sewer air upon traps. In the drawing marked Fig. 3 is shown a glass flask with a bent glass tube inserted in the cork—the bend forming a trap which is filled with water. If the hand be placed on the flask, its warmth is sufficient to so expand the air within that the water in the bend of the tube is driven out, leaving the trap unsealed. By partly immersing the flask in cold water, the air within it is so contracted in volume that the pressure of outside air forces the water in the bend of the tube into the flask, also effectually and promptly unsealing it. The air of every waste and soil pipe is subjected during the day to frequent expansions and contractions, which may, and often do, unseat traps. Under these conditions, it is readily seen that when the mouth and manhole ventilators of a sewer are closed, any increase in the volume or temperature of the flow will cause the confined air to struggle for a means of escape, which it usually finds at some trap. It will do this just as soon as its pressure equals that of the column of water within the trap; consequently, the trap containing the least depth of water will be the first one in which there will be trouble. To displace a seal altogether, no very great force is necessary. A



Fig. 3.

three inch seal affords a resistance to the passage of air equal only to a pressure of 2 oz. per square inch. If there is a pipe rising to the roof, and opening there, the pressure is relieved, and there is less danger of sewer gas finding its way into the house, providing the various parts of the apparatus connected with the sewers, soil pipes, etc., are arranged properly in other respects.

CAUSES WHICH UNSEAL TRAPS.

To the pressure from within the sewers, tending to force sewer air into our houses, we may also add the suction of the houses themselves. During the season in which fires are used, and, indeed, during the nine months of the year when we live with closed windows, there is a constant outflow of air from the house through the chimneys. The suction thus produced varies greatly under different circumstances. In any case it is enough to cause a great deal of air to enter by a very small opening, and when doors and windows are carefully sealed with list and weather strips, the draft upon the traps may be very considerable. Were the traps empty, a strong inflow of air through the pipes would be thus produced, and with the traps sealed it very effectually supplements the pressure resulting from the causes already noted. I see no reason, however, to apprehend danger from either pressure or suction when the soil pipe is properly ventilated, as shown in Fig. 4.

In trapping pipes there is a good chance for the unskillful plumber to defeat the end he seeks to accomplish. My attention was lately called to a house occupied by a friend, in which the faint, depressing odor always noticeable in the bath room and adjoining apartments, revealed the presence of sewer gas. A thorough examination of the plumbing work was made, which revealed certain defects only too frequently met with in private dwellings. In the bath room there was a common tub, basin, etc., after the usual practice. A careful examination showed that the waste pipe from the bath tub was connected with the soil pipe of the closet below the trap, consequently, the air from the sewer escaped into the room. Closing this opening was of no use, however, until the basin waste was also closed, when there was a slight improvement; but sewer gas continued to escape through the overflow pipes, which were without traps and connected in the usual manner, and which could not be tightly closed. This was, of course, a case of gross neglect, carelessness, or ignorance on the part of the plumber. If the overflow and waste pipes were to be carried into the soil pipe below the main trap, they should also have been provided with traps, for otherwise the sewer is practically opened into the house. Though this arrangement of pipes is about as bad as it could be, it is by no means uncommon. In another instance, when inspecting a very costly job of plumbing in a Western city, I found that an attempt had been made to form a stretch trap in each of the waste pipes, both from bath tubs and basins, but the plumber, apparently ignorant of the action of the trap, had, in several instances, after bending his pipe, set it up at such an angle that the water remaining in the trap would hardly fill the pipe, while in other cases the bends were so long and so nearly horizontal that the force of the water would nearly empty them, and leave a passage for air above it. In most cases of defective trap arrangements which have come under my notice, it is but just to say that the fault lay wholly with the plumbers. The pipes were improperly placed, the traps set up wrong, or the work in some way "botched" in putting it together. This shows the danger of entrusting plumbing work to incompetent, ignorant or careless workmen, when any connection is to be opened between the sewers and the inside of a house. Fortunately for many so-called practical plumbers, but unfortunately for the public health, comparatively few persons know whether the work for which they pay is done properly or not, especially when it is so placed as to be difficult of access; but when the presence of sewer gas is detected, and the cause of its presence is unknown, it would, in every case, be a judicious economy to employ an expert to discover and remedy the defect at any cost.

(To be continued.)

New Type of Coke Ovens.

The coke ovens at Almond Iron Works, near Falkirk, N. B., are described as follows, by Mr. Henry Aitken: The novelty of this new type of ovens consists in forcing either heated or cold air into the space above the upper surface of the materials being coked, so as to burn the gases and promote the coking process. The following is the working of these ovens as described by Mr. Aitken: When the oven has been properly dried and heated, it is charged either through the doorway or the outlet for the gases, and as soon as the heat has evolved and ignited sufficient gas, the blast is turned on and the air forced in through air holes, and the blast is continued and regulated so long as gas comes from the coal, the outlet for the gases being partially closed, and the air being regulated so that the mixture of gas and air, till near the end of the charge, shall always have in it unconsumed carbon. The quantity of air required is always largest at the beginning of the charge, gradually diminishing to the close. So soon as the gas is all evolved the coke is either allowed to cool down or is watered out and drawn.

The writer next stated the results, first with the new arrangement applied to the ordinary Beehive ovens, and next to horizontal through and through ovens. In the first the average charge put into the ovens was 3 tons 4 cwt. of coal, and the average time from charge to discharge sixty-two hours. With the same coal in ordinary Beehive ovens, the time required is eighty hours. The time varied, however, according to the nature of the coals. The quality of the coke produced is pronounced by all the parties who have seen it to be first-class

equal to any made from the Beehive oven. The weighing was done with the greatest care, and with the exception of Blackbrass, the weights were checked by representatives of the parties whose coal was being coked, and may be depended upon as correct. The losses with Melburn coal and Burnhill soft are exceptionally high, owing to the large amount of dirt in them, causing a great quantity of breeze. The results from the application to the horizontal oven No. 2 was equally good, and the amount of breeze less. The quality was even superior. At present the oven was drawn by crane in the old-fashioned way, but it was proposed to take it out with a large shovel, with or without sides, worked by a steam engine or hydraulic machinery. As the coal in coking shrinks about an inch from each side of the oven, it was thought no difficulty will arise in working in this way. The coal was also to be charged by machinery.

It will be seen, continued the writer, from the novelty adopted in these ovens that the temperature maintained is very high, and that the gases as they leave the oven not being charged with a great quantity of air can be utilized either for heating the air or for driving the fans of the blast. Even after this is done there should be a large surplus of available heat. With most coals, particularly those of a dull semi-coking or partly burnt nature, hot blast is to be preferred, but with a quick cold blast does equally as well. Although the ovens are subjected to a high heat, it is not found that the brick work suffers. There being almost no waste of coke, and therefore, almost no ashes formed, there is no fluxing of the brick work with the iron, lime, &c., of the ashes as in ordinary ovens. Few coals have more tar in them than is required to make good coke, but where such a coal is made into coke these tars may be drawn off by a pipe or pipes at the bottom of the oven, the gas exit being partially closed, and thereby creating pressure sufficient to force the gases through the pipes. Several pallfuls of tar and ammoniacal water have in some cases been taken from a single oven, but the quality of the coke has always suffered. Owing to the high heat got in these ovens, coal that could never be coked before has been converted into good coke. The Pleas Coal Company, near Surling, has four ovens of their No. 2 coal tried, from which they never had been able to make coke, and the result was 66 per cent. of very fine coke. With these ovens the coke may be watered out as in an ordinary Beehive oven, and in this respect are unlike all descriptions of fluid ovens where the gases are burnt in chambers separate from the coal. The only extra expense that would be incurred in adopting this novelty is the cost of the pipes, fan and engine. It is thought that one man could attend to the fans and engine and the regulation of air to 100 ovens.

Post Offices on Wheels.

Three cars, styled the Palace Drawing Room Postal Cars of New England, have just been completed at Allston for the Boston and Albany Railroad Company. They are 60 feet in length, the longest on the road, are constructed of the choicest materials, and finished in hard wood in natural colors, and are provided with all the modern improvements ingenuity could suggest. A large and novel lamp, manufactured by the company, and having four burners and four reflectors, is suspended from the roof of each car, giving ample light. About 20 feet of each car is partitioned as a store room for through mails, while the remaining space is divided into sections devoted to different purposes. The section in the middle is intended for letter sorting, another section is specially designed as a newspaper department, and still another section is used as a receptacle for bags, and is provided with racks, hooks, and other conveniences for facilitating the making up of the mails. Each car is provided with water tanks and set bowls similar to those in palace passenger cars. In the letter department of each car are 470 boxes with wire netting bottoms, which prevent the accumulation of dust, while the newspaper department of each has 27 boxes, and the whole are labeled with the names of postal stations, and the principal postal routes in the country. When leaving Boston, these cars each require four clerks or route agents, but when returning to Boston, only two clerks are requisite. These cars make runs of 400 miles a day, but the postal clerks only run half that distance a day.

Improved Railway Axle Boxes.

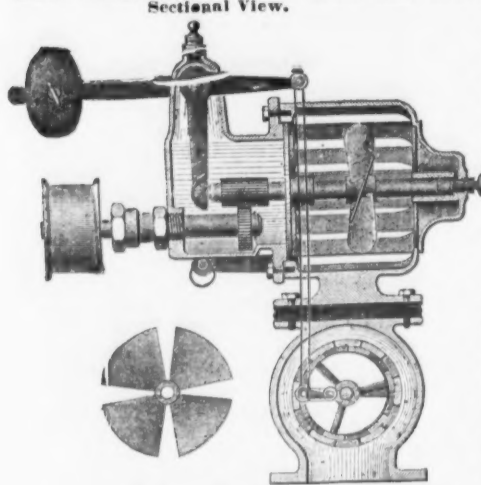
Mr. C. A. Hussey, of this city, has patented an improved plan to prevent dust and sand from getting into railway axle boxes. This is accomplished by means of leather packing, arranged to form a tight connection from the box against the wheel, so that the lubricating fluid may be poured into the box, to allow the journal to run in oil. The invention does away with the old dust plate and the cotton waste packed in beneath the journal. The axle box is made shorter, smaller, and consequently lighter and cheaper than the common box, while it accomplishes the object in the most perfect manner, that is, the complete lubrication of the journal and its consequent protection from heating and wearing. Mr. Hussey has also another invention, which is an improved method of preserving the journals and brasses of railroad axle bearings from heating and wearing. This is accomplished by producing a circulation of water or other liquid through the brass or box, which receives all the friction of the journal. The brass of the axle is chambered out in any suitable manner, and elastic tubes are connected therewith for conducting and discharging the water to and from the brass. A lively current of water is produced from an elevated reservoir, which keeps the brass and journal at a low temperature. The ordinary absorbent, cotton waste, may be used in axle boxes having this cooling current applied to the brasses, with safety from heating and wearing.

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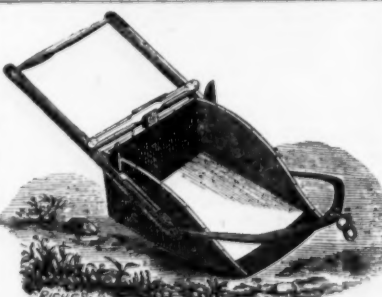


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spike works, etc., which do a very large business in these branches, and which swell the value of the manufactured products in the

Petroleum and Gas in Ohio.

The Pittsburgh Commercial says: From Mr. Richard Carter, of 232 Liberty street, this city, we learn the particulars of a discovery of petroleum and petroleum gas at Sciotoville, Ohio, on the grounds of the Scioto Fire Brick Company. It seems that in January, 1870, two men, John Brown, Sr., and David Jones, bought a strip of 12 acres of land on the bank of the Ohio River, near the site of the present village of Sciotoville. Mr. Jones was a practical man, and it occurred to him that on this land salt water might be found. He commenced digging a well, with the appliances of that day, and after sinking it to a depth of 75 feet, walled it with sawed trunks of hollow sycamore, and then by the slow and laborious process of that time, he drilled to the depth of 350 feet, tubing with wood and tin tubes of about two and one-half to three inches in diameter. He struck salt water, said to be so strong that a spoonful of salt would be insoluble in a pint of water, but the flow was weak, and was hindered by a strong flow of petroleum and a steady pressure of gas. Not knowing the value of his discovery, and being financially unable to prospect further, he abandoned the well, closing the tubing with a heavy pine plug, nearly three inches in diameter. The pressure of the gas was so strong, that a half-inch hole was made through the plug, so it could be driven in, and then a smaller plug driven in that. Moving on his farm, he set to work to earn means to continue boring his well, but before he could do so he sickened and died, salt dropped down to 15 cents per bushel, and his heirs never took up the unfinished work that he had abandoned.

The oil and gas bubbled up, but nobody knew their value, and the well attracted no attention further than that the petroleum was used by the natives to rub on their sprained, bruised or rheumatic limbs, and both petroleum and gas were fired by wondering groups of men and boys as they bubbled up on the Ohio River, which, in the years since 1870, had cut away the bank and spread its waters over the well. The uninformed wondered what manner of thing this was that ignited at the touch of a match, and was carried on by the waters, and island of flame.

But it is now to be turned to account. The land changed hands until the Scioto Fire Brick Company came into possession of it, in 1872, and the president of the company, Mr. W. Q. Adams, concluded recently to reopen the well, and did so, and when the end of the tubing was reached and the plug removed, petroleum flowed faster than a man could bail it out with a bucket, while the pressure of gas was very strong. A long iron tube was lowered and loosely inserted in the tubing, and when a match was applied at the top of the iron pipe, the gas was ignited and burned with a steady flame, while a piece of burning paper was communicated to the oil on the water, and the whole surface was soon ablaze.

With such favorable indications, the company at once set about to utilize this gas, and as the old well is only about 20 feet above low water mark, the idea of using the well was abandoned, and the company began digging a well on the bank near their lower brick yard, and have reached the rock, engaged a practical well digger, are preparing their derrick, and will begin boring as soon as the river opens, using the power from their engine in the works.

If the company find gas, as they no doubt will, it will enable them to run their entire works with gas, light the work and store, and make an immense saving in the way of fuel.

Should the old well be utilized, as it can be done, the flow of petroleum may be such as to make the village of Sciotoville one of the most important in Southern Ohio. It has extensive coal fields within 12 miles of the corporate limits; rich beds of ore as near; the best fire clay within a stone's throw of the place, and if it has petroleum and gas hidden under its walks and avenues, the broad sweeping river on its south, and a railroad running through it, it will widen its borders, extend its domains, dot its squares with iron works, its hills with furnaces and its valleys with derricks.

The Blair Iron and Steel Company are erecting an additional furnace, which will be completed probably by the 1st of April, when the capacity of the works will be increased from 24 tons of steel per week to 90 tons per week. The demand for the product of this mill has become so great that this increase in the facilities was absolutely necessary. As soon as the improvements are completed, the mill will be run to its full capacity.

Special Notices.

DISCOUNT LISTS.

Screws, 20 to 60¢; Bolts, 25 to 60¢; Files and Rasps, 25 to 60¢ to the 4¢. Complete for \$1.00.
DAYTON & LAMBERSON, 83 & 85 Duane St., N. Y.

Wanted.

A superintendent of experience capable of taking charge of a Malleable Iron Works.

Address
ST. LOUIS MALLEABLE IRON CO.,
2116 Market Street, St. Louis, Mo.

The managing partner of a Retail Hardware House doing a business of one hundred thousand yearly, is about to retire from the firm, and would accept a situation as traveling salesman for a first-class manufacturing or jobbing establishment, with route west of Chicago.

References first-class. Ready April 1st.
Address "CALIFORNIA,"
Office of The Iron Age,
No. 10 Warren Street, N. Y.

Special Notices.

THE CHATTANOOGA Foundry and Machine WORKS, Mining & Manufacturing Co.

(Late WEBSTER & MARKS and THOS. WEBSTER, Chattanooga, Tenn.)

Incorporated under a charter granted by the State of Tennessee: Capital, \$500,000, in 5000 shares of \$100 each, with power to increase to \$1,000,000. Subscribed Capital \$150,000 in 1500 shares of \$100, each, fully paid up.

This Company is formed for the purpose of acquiring and extending the established business and works of Webster & Marks, well known as Thomas Webster's Foundry and Machine Works, situated at Chattanooga, Tennessee, established in 1857, for building every description of Foundry, Mechanical and Engineering requirements, and for the purpose of purchasing or leasing mineral lands and erecting works thereon.

The Works are substantially erected on about five acres of land, all of which is freehold, and are situated in a most eligible position for making all kinds of Castings and Machinery, in the center of the Coal, Iron and Mining districts of Tennessee, Georgia and Alabama, and surrounded by at least twenty Pig Iron Furnaces in those States. They are located above high water in the center of the city, and connected by a side track with all the lines of Railroad crossing in Chattanooga.

These Works have been most successfully carried on by Mr. Thomas Webster, are in full operation, and comprise a large and well equipped Foundry, connected with the Machine Shops by a narrow-gauge track, and contain one of Scott's English Patent Gear Wheel Molding Machines.

The Machine Shop, the largest in the entire South, is fully equipped with the best and most modern improved machinery, consisting of Lathes, Planers, Boring Mill, Drill Presses, &c. The Pattern Shop is fitted up with all the necessary Tools and Machinery for making Patterns. The large Blacksmith and Boiler Shops are fully equipped.

The stock on hand is of recent purchase, and all in good working condition. There is also a large and valuable amount of patterns for furnace and mining machinery, peculiarly adapted to this country, and for the building of Narrow-Gauge Locomotives. The Works are well supplied with orders, and the opening and development of new Iron Ore deposits and other mineral properties in the neighboring country, with a rapidly increasing population, combine to increase the demand for machinery of all descriptions.

The Works will be transferred to the new Company in full working condition, with all beneficial contracts, and will include the whole of the land and buildings thereon, together with the modern and valuable Plant, Machinery, Fittings, Sliding and good will.

The contract price of the Works to the Company will be \$120,000; \$50,000 in cash and \$70,000 in 700 ordinary shares of \$100 each, fully paid up.

The estimate on which this sum is based is from a carefully made valuation of freehold land, buildings, machinery, plant, patterns, fixtures, sliding and good will.

The Directors and Officers of this Company will be appointed at the first meeting of the stockholders, of which due notice will be given.

Prospectus, copy of charter and forms of applications for shares may be procured from the Secretary pro tem, at the offices of the Company at the Works. Each application for shares must be accompanied by a payment of \$10 per share on application.

Should no allotment be made the deposit will be returned without deduction.

(Here follows the charter, which is very full in its grant of manufacturing and mining franchises.)

Opinion of Counsel upon Validity of Charter.

(Copy.) CHATTANOOGA, TENN., Jan. 19, 1875.
THOMAS WEBSTER-SIR: We have examined the accompanying copy of charter of "The Chattanooga Foundry and Machine Works, Mining and Manufacturing Company," with a view to ascertain its validity, &c., and have come to the conclusion that the charter was regularly obtained and is legal. Under it the company or corporation may safely organize and invest their money or other capital. All the powers enumerated in said charter are consistent with the Constitution of the United States and of the State of Tennessee; and they would be enforced in the courts of the country in law and in equity.

Respectfully, (Signed)
TREWITT, GASKILL & TREWITT, Atty's.

Prospectus and forms of application for Shares can also be procured from

GRIGGS & CARLETON,
Financial and Business Brokers,
98 Broadway, New York.

Wanted.

A salesman who is acquainted with the Hardware and Furniture trade, and with manufacturers generally, by a large wholesale manufacturing house. None but first-class men, well recommended, need apply. Address, giving nationality, salary expected and age,
J. Z. S. & Co.,
P. O. Box 4011, New York.

TO MANUFACTURERS

OF AM. Pocket & Table Cutlery, Files, Saws, Curry Combs, &c., &c.
A New York Hardware and Importing House, canvassing the principal cities of the Western and Southern States, is desirous of securing the sole agency to represent a manufacturer of American Pocket and Table Cutlery, Files, Saws, Curry Combs, &c., &c. Address
A. H. B.,
Box 2738, New York, P. O.

WANTED. IMMEDIATELY.

A Hardware Store, consisting of a stock of Builders' and Manufacturers' Hardware (no stove or tin ware wanted), between 42 north and 37 degrees south latitude, also east Mississippi River. Also, for sale, one store, located in Northern Ohio, and one in Western N. Y.; capital required from \$5000 to \$8000; terms easy. Parties desiring help, please address. Goods sold on commission. Reference and security given. A* kind of business transacted. Charges reasonable. Address
JOHN J. HARRIS,
P. O. Box 1633, Binghamton, N. Y.

Special Notices.

\$85,000

Will Purchase the Controlling Interest in an Established Manufacturing Company, situated in New England. A splendid chance for a business man or for investment.

Address, in first instance, CONTROL,
Office of The Iron Age, 10 Warren St., N. Y.

Exposition, Santiago, Chili

A gentleman connected with the Hardware Trade, visiting the Exposition to be held at Santiago, Chili, September next, in charge of goods in the Hardware line, will make arrangements with other desirable parties to exhibit and represent their goods.

Address
EXPOSITION,
Office of The Iron Age, 10 Warren St., N. Y.

EUGENE BISSELL, AUCTIONEER.
By BISSELL, WELLES & MILLET,
Successors to R. T. HAZELL & Co.,
Store No. 15 Murray Street.

Our REGULAR SALES of HARDWARE, CUTLERY, FANCY GOODS, &c., will be held on TUESDAYS and FRIDAYS throughout the season. CASH ADVANCES made on CONSIGNMENTS without additional charge.

A PARTNER WANTED

by the 1st of January, 1875, in an established Hardware business, who can put in from \$20,000 to \$25,000, either cash, or stock suitable for jobbing trade.

For particulars, address, B.,
Office of The Iron Age, 10 Warren St., N. Y.

Wanted.

By an energetic man, a position with a first-class house (iron preferred). Competent to take charge and manage a business. Six years' experience as manager at Charcoal and Anthracite furnaces. Thoroughly conversant with bookkeeping. First-class references. Address,
BUSINESS,
P. O. Box 702 Pottsville, Pa.

DROP FORGINGS.

The TRENTON VEE & TOOL WORKS, Trenton, N. J., having increased their facilities, are now able to do all kinds of

Iron and Steel Drop Forgings in quantities to order at reasonable rates.

HEEMANN BOKER & CO., Proprietors,
101 & 103 Duane St., N. Y.

Merchant Iron or Nails

Wanted in exchange for 200 tons No. 1 Wrought Scrap Iron.

GILCHRIST & GRIFFITH,
Mount Pleasant, Iowa.

TO LET,

The Light, Handsome Office

Now Occupied by
MESSRS. HEATON & DENCKLA.
Possession immediately.

HERMANN BOKER & CO.,
101 Duane Street, N. Y.

MERCANTILE AGENCY.

For the sale of Hardware or any Mercantile Business. Parties desirous of going to business cannot do better than to address this agency. Also clerks, clerks or assistants, please address this agency. Hardware stores for sale; and wanted. Stamp inclosed insures answer.

Address,
JOHN I. HARRIS,
Box 1633, Binghamton, N. Y.

HARDWARE.

FOR SALE in the best business part of Jersey City, a first-class Tool and Hardware business. Established about 25 years, and doing a fair business.

Apply to
H. LUTIGEN,
57 Montgomery St., Jersey City.

Briesen's Patent Agency

FOR SECURING INVENTIONS, TRADE MARKS, &c., IN AMERICA AND EUROPE.

No. 258 Broadway, New York.
A. V. BRIESEN.

McHaffie Direct Steel Castings Co.

STEEL CASTINGS,
Solid and Homogeneous, guaranteed to stand a Tensile strain of 25 tons per square inch. An invaluable substitute for expensive WROUGHT IRON FORGINGS or for Iron Castings, where great strength is required. Office, cor. 4th and Leavenworth Sts., PHILADELPHIA.
Send for Circular and Price List.

Charcoal Blast Furnaces.

Having during the past 10 years constructed and put in operation a number of the most successful Charcoal Blast Furnaces in the country, and having a competent corps of workmen constantly in my employ, I am enabled to offer advantages in constructing or remodeling upon the latest and most approved plans.

Examinations of Furnace Property made and reported upon when solicited. Correspondence promptly attended to.

J. H. WHITE, Engineer,
22 W. Alexander St., Rochester, N. Y.

MANUFACTURERS

desirous of introducing their goods to the British and Continental Markets, are advised to insert advertisements in the newspaper "IRON," published every Saturday, at 99 Cannon Street, London, E. C.

SCALE: First 3 lines, 3/; every additional line, 10d. Paper, 6d. per Copy, or 30. per annum, inclusive of postage to the United States.

A. PURVES & SON,

Corner South & Penn Streets, Phila.,
Dealers in
Scrap Iron & Metals, Machinery, Tools, Shafting & Pulleys, Steam Engines, Pumps & Boilers, &c., &c., Brass, Tin, Habit Metals, Foundry Facings. Best Quality Ingot Brass. Cash paid for all kinds of Metals and Tools.

Wanted.

A situation as bookkeeper or cashier of an iron works, a hardware business, or in the coal trade, which the advertiser understands in all its branches. Highest references of character, capacity, &c.

Address,
H. D.,
Office of The Iron Age, 10 Warren St., N. Y.

Special Notices.

SPECIAL NOTICE.

I have three patents for Dies, Machinery, and Tools for making Angers and Bits, each running seventeen years; dated as follows: Dec. 19, 1855; January 31, 1856, and July 3, 1856. There is a special claim on each of the Dies. All persons infringing on said patents will be held responsible to the extent of the law.
RUSSELL JENNINGS,
DEEP RIVER, Conn., Sept. 7, 1874.

OFFICE OF H. A. ROGERS, 19 JOHN ST.,
NEW YORK, January 20th, 1875.

The Firm of H. A. ROGERS & CO., 50 and 52 John Street, is this day dissolved by mutual consent. H. A. ROGERS retiring.

New York, January 18, 1875.

In calling your attention to the above notice, I beg to say that I will continue business in my own name and for my own account at No. 19 John Street, where may be found a complete stock of Railway, Mill and Machinery's Supplies.

H. A. ROGERS.

Engineering engagement desired by an engineer, accustomed to the computation of strains in structures, and to the use of all varieties of engineering instruments, of experience in testing the strength of materials, and recently Assistant Inspector for the Illinois and St. Louis Bridge Co. Would take charge of a draughting room, or of construction. Bridging preferred. Address
C. S. D.,
Drawer 9, Wolcott, N. Y.

STERLING

IRON & RAILWAY CO.,

STERLING

ANTHRACITE PIG IRON

FOR FORGE AND FOUNDRY USE.

MAGNETIC IRON ORE

FOR BLAST AND PUDDLING FURNACES.

A. W. HUMPHREYS, Treas.,
42, PINE ST., N. Y.

For Sale, &c.

Hardware Store For Sale.

Will sell on good terms (no bonus)

One of the best appointed Hardware

Stores in the West,

Located in a Growing Manufacturing Town of 12,000 Inhabitants,

Doing the Leading Business.

Present Stock about \$11,800, all fresh and nicely

sampled in boxes. With a small additional capital

a business of \$80,000 a year can be done

Must be sold by April 10th.

Address
HARDWARE,
Box 1922, Eau Claire, Wis.

BLOWING ENGINE

For Sale.

One Horizontal Blowing Engine, with vertical blowing cylinders. Steam cylinder, 25 in. diameter by 60 in. stroke; two blowing cylinders, 7 1/2 in. diameter by 60 in. stroke. The engine is geared so that the steam piston makes two revolutions for one of the blowing cylinders. The engine was formerly used at the Durham Iron Works, Hedgesville, Pa., to blow an anthracite furnace 35 ft. high by 15 ft. bosh. The furnace having been rebuilt of much larger dimensions, the old engine will be sold at a low price.

Address,
COOPER, HEWITT & CO.,
17 Burling Slip, New York.

For Sale or To Let

At a bargain, the large and commodious Factory, 205, 207, 209 and 211 East 33d Street, 100x300 feet, running through to 34th Street, three stories and basement, with or without engines, boilers and main shafting.

For particulars, apply to
No. 699 Broadway, New York.

LOWE & THOMASSON,

Chattanooga, Tenn., Dealers in

MINERAL LANDS.

Surveys Made and Titles Investigated. Parties desiring information or wishing to purchase ore or coal lands within the States of Tennessee, Alabama or Georgia, are respectfully requested to communicate.

We have For Sale Very Cheap

Two of the

Finest Charcoal Properties

in America. Brown Hematite Ore, 56 per cent. Metallic Iron, and less than 1-20th of 1 per cent. of Phosphorus. Car Wheel Iron can be made for \$16 per ton.

Also, 6400 Acres Bituminous Coal Lands, for which part payment will be taken in Northern Pacific R. R. Bonds.

FOR SALE.

At Lowest Manufacturers' Rates.

GUNS & SHEET ZINC,

Best German and Belgian Brands,

By LOUIS WINDMULLER & ROEKKER,
20 Beude Street, N. Y.

For Sale, &c.

MACHINERY FOR SALE.

The following machinery, &c., being that recently owned by the

American Rolled Nut & Tube Co.,

at very low prices. Consisting of several sets of

ROLLS, HOUSINGS, BED PLATES, &c.,

for Rolling Nuts, including machines for finishing.

1 train of

8 in. Guide Rolls.

Large quantity of

Rolled Nuts for Bolts,

from 1 1/4 to 2 in. diameter, reamed and hurred ready for use.

Lot of

STANDING PLATES.

These nuts have been extensively used, and are regarded as equal to any made, and will be sold much under the market value. Will also sell a

Fourth Interest in the Patent for making these Nuts.

It is confidently believed that nuts can be made on this plan cheaper and better than on any other yet adopted, and may be rolled of any length or size that may be required. All of the above machinery is nearly new and in complete order. For further information, apply in person or by mail to

N. C. NEWTON,
Metropolitan Iron Works, Richmond, Va.

FOR SALE.

An 1/4 inch mill train for making Merchant, Band and op Iron. Will be sold cheap.

Apply to
W. W. JONES,

Near the Lehigh Valley Railroad Depot,

Allentown, Pa.

For Sale.

An old established Hardware Store, in connection with Paints and Oils, also House Furnishing Goods, in the city of Brooklyn, doing a good business.

Stock about \$15,000, with lease of store (on one of the leading avenues) for five years from May last. Part unencumbered Real Estate or First Mortgages would be taken. Address JAS. TALMADGE,
10 Ralph Ave., Brooklyn, N. Y.

To Stove Manufacturers and Foundrymen.

The Carbon Stove Company,

Of Burlington, N. J.,

Will sell their Foundry, with all its appurtenances, business and good will, upon very liberal and accommodating terms, offering to any party wishing to engage in the Stove or general Foundry Business a rare opportunity.

The Foundry Buildings, which are of a capacity to employ forty or more molders, are very conveniently located upon navigable tide water on one side, and the Pennsylvania Railroad, with its freight station in front, being on the direct line between New York and Philadelphia.

The Buildings, Machinery and Appliances are all in prime order, and the assortment of Patterns, &c., for Stove, Range or Heater work, unsurpassed.

Address, for terms or other particulars,
CARBON STOVE CO., Burlington, N. J.

Steam Forge For Sale.

The whole or a half interest. Address

"STEAM FORGE,"

Room 31, No. 5 Beekman Street,

New York City.

For Sale!

Hardware Business

In a growing manufacturing town, one of the best locations in Vermont. Business well established and profitable. Stock about \$10,000, in good order. This affords an excellent opportunity for a party with small capital to secure a paying business.

Address, W. R. BIRBY & SON,
Vergennes, Vt.

For Sale.

A good Wagon Factory, in Central Iowa; shops, 22x80 and 20x40; on a good railroad; with or without material. 140 wagons sold last year in the town, and good facility to increase the business to 200 or 300 wagons a week. There is an increasing demand for wagons. Apply to or address,
ED. MEISKER,
Dezter, Dallas Co., Iowa.

For Sale.

A Zinc Mill, consisting of Rolls, Furnaces, Shears and Tools, all in complete order, ready to run at once. Situated near New York on leased ground. Lease covers buildings, engine and boilers, and is a valuable one, having privy of extension. For full particulars, address,
Box 2166, N. Y. P. O.

IMPORTANT

Pipe, Fittings, &c.

Thomas T. Tasker, Jr.

Stephen P. M. Tasker

MORRIS, TASKER & CO.,PASCAL IRON WORKS, Philadelphia,
TASKER IRON WORKS, New Castle, Del.,

Office, Fifth and Tasker Streets, Philadelphia.

Office and Warehouse, No. 15 Gold Street, New York.

Office and Warehouse, No. 36 Oliver Street, Boston.

MANUFACTURERS OF

WROUGHT IRON WELDED TUBES,

Plain, Galvanized and Rubber-Coated, for Gas, Steam and Water.

Lap-Welded Charcoal Iron Boiler Tubes.

Oil Well Tubing and Casing, Gas and Steam Fittings, Brass and Steam Fitters' Tools, Cast Iron Gas and Water Pipe, Street Lamp Posts and Lanterns, Improved Coal-Gas Apparatus, Etc.

Ecton Mills Genuine London TURKEY EMERY.

TRADE MARK.



ABBOTT & HOWARD, Agents for the United States.

81 John Street, New York.

35 Oliver Street, Boston.

BAILEY'S PATENT ADJUSTABLE PLANES.

Thirty different styles in

IRON AND WOOD.

80,000 ALREADY IN USE.

Smooth Planes,
Jack Planes,
Fore Planes,
Jointer Planes,
Block Planes,
Rabbit Planes,
Circular Planes.Carpenters,
Cabinet Makers,
Car Builders,
Carriage Makers,
Millwrights,
Wheelwrights,
All Use them.Manufactured by the **STANLEY RULE & LEVEL CO.,**
Factories: New Britain, Conn. Warehouse: 35 Chambers Street, New York.**AMERICAN LOCK MFG. CO.,**

Manufacturers of

**FELTER'S
Locks & Latches,**

Comprising

Store Door Locks, Night Latches,
Drawer, Desk and Pad Locks,
All of which are furnished with**SMALL, FLAT, AMERICAN STERLING METAL KEYS,**

Which are stronger than steel, and cannot be affected by rust, and will remain bright and clear under all ordinary circumstances.

A candid examination will convince the most unbelieving, that for simplicity, durability, convenience, and safety, they challenge comparison with any now before the public. Being made entirely by new and expensive machinery, especially constructed to manufacture them, they will rival the best made Locks in Finish and perfect operation.

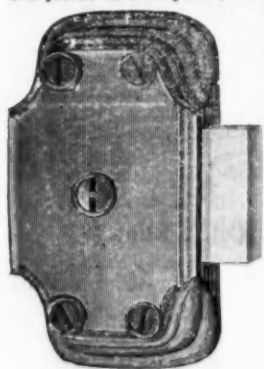
These Locks give perfect satisfaction, because they are the safest, cheapest and most durable Lock ever presented to the public, having thirty-five finely finished Brass Tumblers in each Door and twenty-eight in each Drawer Lock, each one being finely false notched. Each tumbler bearing on the key at two different points while locking or unlocking, without the aid of springs, which cannot be said of any other patent Tumbler Locks in use.

THE LOCKS ARE FITTED TO THE KEYS,

And not the Keys to the Locks.

Hence Counterfeit Keys cannot be made.

For descriptive list and terms, address,

UNION NUT CO., Sole Agents,
78 Beekman Street, New York.**New Patent "X" Razor Strap.**

PATENTED DECEMBER 23, 1873.

This Strap, designated on our List as Letter "X," is of novel construction—is elastic, pleasantly yielding to the razor—gives a keen fine edge—is made of superior stock—is furnished at a low price—and gives universal satisfaction.

ITS PRICE SELLS IT.

BENJAMIN F. BADGER, Sole Manufacturer,

Badger Place, Charlestown, Mass.

Pipe, Fittings, &c.

National Tube Works Co.,

BOSTON, MASS. and McKEESPORT, PA.,

MANUFACTURERS OF

**Best Quality Lap Welded Iron Boiler Tubes,
STEAM AND GAS PIPE,**Artesian Oil and Salt Well Tubing and Casing,
With Patent Protecting Coupling;**Mack's Patent Injector for Feeding Boilers.**

JAMES C. CONVERSE, President,

McKeesport.

WM. S. EATON, Treasurer,

Boston.

New York Office and Warehouse 78 William cor. Liberty Street.

McNab & Harlin Mfg. Co.,

MANUFACTURERS OF

BRASS COCKSFor STEAM, WATER and GAS.
Wrought Iron Pipe & Fittings, Plain and Galvanized**PLUMBERS' MATERIALS.**

Illustrated Catalogue sent by express to the Trade on application.

Factory, Paterson, N. J.

56 John Street, N. Y.

PANCOAST & MAULE
227 Pear St.
PHILADELPHIA.**WROUGHT IRON PIPE**FITTINGS, BRASS & IRON VALVES & COCKS
TOOLS & STEAM FITTERS SUPPLIES &c.
PIPE CUT & FITTED TO PLANS FOR MILLS &c.**CONTRACTORS**FOR HIGH & LOW PRESSURE STEAM HEATING
APPARATUS FOR ALL CLASSES OF BUILDINGS.

Send for Illustrated Catalogue.



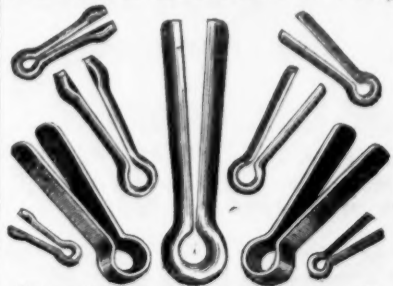
WM. ESTERBROOK,

Wholesale Manufacturer of

Coal Hods, Fire Shovels, etc.
311 Cherry St., PHILADELPHIA.**CAST IRON PIPES**

FOR WATER AND GAS.

Branches Retorts, &c.

Warren Foundry & Machine Co.,
PHILLIPSBURG NEW JERSEY.**GEORGE BARNES & CO.,**

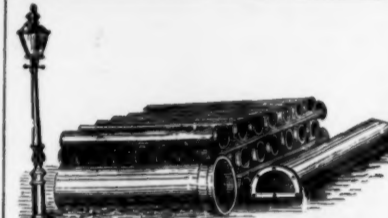
Manufacturers, Syracuse, N. Y.

ENCAUSTIC TILES.ALEXANDER FINDLAY,
Importer.

99 MAIDEN LANE, N. Y.

Sole Agent in the U. S. for

GRAVES, DUNNILL & CO., (Limited.)

**R. D. WOOD & CO.,**

Philadelphia,

Manufacturers of

Cast Iron Pipe

FOR WATER AND GAS.

Lamp Posts, Valves, &c.,
Mathew's Pat. Anti-Freezing Hydrants.

400 CHESTNUT STREET.

Chapman Valve Mfg. Co.,**STEAM VALVES,**

Iron and Composition, of all sizes.

WATER and GAS Gates, 3 to 48 inches
HYDRANTS.

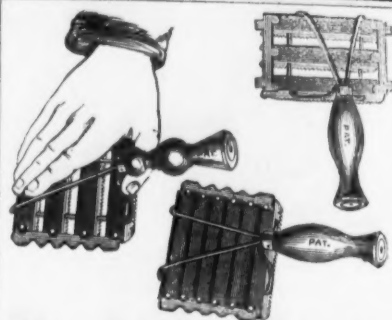
Office and Warehouse, 75 & 77 Kilby St., Boston, Mass.

**TURNED
MACHINE SCREWS,**One-sixteenth to five-eighths diameter.
Heads and points to sample.

IRON, STEEL and BRASS.

Lyon & Fellows Mfg. Co.,

Cor. 1st and North 2d Streets, Williamsburgh, N. Y.

**The Perfect Comb.**We call your attention specially to our new patent end-
less wire frame comb. The result of a long series of ex-
periments, made with a view to meeting all the require-
ments of a Perfect Comb. It is better, stronger, and
more durable than any ever before invented. The raised
wire shank gives what has never before been attained,
viz: a rest and brace for the thumb, in such a position
that the hand cannot come in contact with the horse
while using the comb. The wire braces which run from
the shank over the back to the front teeth give strength
and durability in a direction never heretofore attained,
and at the same time serve as an extra handle; and
when clasped by the fingers in connection with the raised
shank the comb is more firmly, easily, and completely
held, and with much less fatigue to the hand than is
possible in any other form—in short, it needs but a
trial to vindicate its name: **The Perfect Comb.****THE LAWRENCE COMB CO.**

Factory and Office,

382 2d Ave., cor. 22d St., N. Y.

WILLIAMS WHITE & CHURCHILL

Successors to

MACKRELL & RICHARDSON MFG. COMPANY

Manufacturers of

Builders' Hardware,Locks, Hinges, Hooks and Staples,
Awning Hooks, Meat Hooks, Pincers,
Champion Noiseless Pulleys,
CHAIN PULLEYS &c.
Factory, cor. Flushing and Nostrand Avenues
BROOKLYN.
Warehouse, 73 Warren St., N. Y.**WM. S. CARR & CO.**

Sole Manufacturers of

Carr's Patent Plumbers' GoodsPumps, Water Closets, Fountains,
Vases, &c.
OFFICE AND WAREHOUSES
106, 108 & 110 Centre Street,
Factory, Mott Haven, New York.**J. AUSTIN & CO.,**

168 Fulton Street, N. Y.,

Proprietors and Manufacturers of

WHEATCROFT'S SELF-ADJUSTING**Pipe Wrench,**

AND

**Scripture's Funnel Top
MACHINE OILERS.**

Dealers in

STEAM AND GAS FITTERS TOOLS.**DRILLS,**Pipe Tongs,
Pipe Cutters,
Pipe Threaders,
Flue Brushes.**M. D. CONVERSE & CO.,**

68 Park Place, N. Y.

PENNSYLVANIA FILE WORKS.

Mill Saw File, Fine Bastard

THE BEST FILE AND RASP IN THE MARKET.

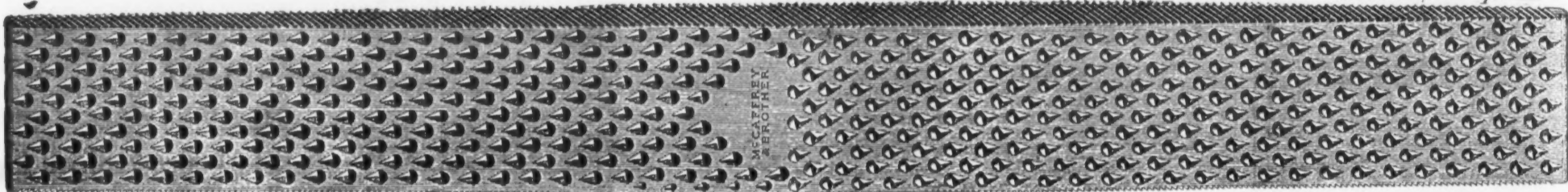


McCAFFREY & BROTHER,
Manufacturers of First Quality Hand-Cut FILES and RASPS only.

N. S. ARNOLD & CO., 312 California St., San Francisco.
Sole Agents for the Pacific Coast.

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Double Horse Rasp



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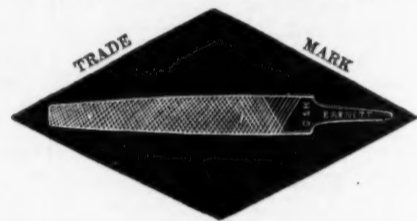
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PRICE LIST.

The Law of Patents

(Concluded.)

PATENTS AND PATENTEES.

A misnomer in a patent of the Christian name of one of the patentees does not invalidate it if it contains a description of him by which he can be identified.

Where one or two patentees were described in the patent as a joint inventor with the other, and was identified as such, the patent was held valid, although his Christian name was erroneously stated.

[N. W. Fire-Extinguisher Co., et al. vs. The Philadelphia Fire-Extinguisher Co., 34.]

A patent raises the presumption that the grantee is the first inventor of the article monopolized; and to overcome this it must be shown that there was a prior knowledge of the invention under such circumstances as to give the public a right to continue the use of it.

If a reasonable doubt exist as to the truth of the evidence adduced to impeach the novelty of the invention, the presumption in favor of the patentee must prevail over it.

[Crouch vs. Speer et al., 187.]

A patent is void which claims substantially the same thing which is claimed by the same party in a prior patent.

[Brown vs. Hatch, 392; Brown vs. Selby, et al., 392.]

Although a man may make valuable improvements upon a patented machine and obtain patents for them, he cannot use the elements of the original machine without infringing on the first patent.

[La Baw et al. vs. Hawkins et al., 724.]

PLEADINGS AND PRACTICE.

The testimony of witnesses of whose names no notice was given to the complainants is admissible to show the state of the art; but will receive no consideration upon the question whether there had been a prior knowledge and use of the invention.

It will require strong evidence to overcome the presumption that a patented machine is substantially different from one patented before, which arises from the Commissioner's having not only issued the second patent with the knowledge of the other, but having afterward renewed it and extended it.

The experts produced by the parties having disagreed whether the machine covered by the

patent in suit was anticipated by one previously patented, the court examined the question itself, and held that it was not.

[La Baw et al. vs. Hawkins et al., 724.]

Where the answer denies that the patentees were the first inventors of the improvement, but gives no notice of the persons by whom, or the places where, it had been previously known or used, evidence of foreign patents and other evidence in support of the answer will not be regarded.

[Earl vs. Dexter et al., 299.]

Evidence against the novelty of the invention of which no notice had been given was held to have been properly received by the master, and the objections should be taken by a motion to suppress the testimony, and not by exceptions to the master's report.

Where it does not appear from the master's report that there was evidence before him to sustain a charge which he has allowed, it will be stricken out.

If an appeal from a circuit court to the Supreme Court does not operate as a supersedeas, security will usually be required of the appellant to only double the amount of costs that the appellee may recover.

If it operates as a supersedeas, further security will be required to twice the value of what is to be recovered.

Where the matter in controversy is secured by other means the rule will be modified at the discretion of the court.

[The American Nicholson Pavement Co. vs. Elizabeth City et al., 764.]

PRELIMINARY STATEMENTS.

The preliminary statement which a party to an interference makes in pursuance of the rules of the Patent Office does not estop him from showing in a suit at law that he made the invention at an earlier date than he there assigned it.

[Union Paper Bag Machine Co. vs. Crane et al., 801.]

REDUCTION TO PRACTICE.

If any one originates certain devices which work well without alteration in the machine for which they are intended after it is completed, a subsequent inventor cannot claim them, although he perfect the machine in which he employs them before the other perfects his.

But he may claim them in a new combination of them with devices of his own which result in a useful machine.

[Brown vs. Guild, 392; Brown vs. Selby et al., 392.]

A patentee held to have made his invention when he had a machine embodying it completed and in operation and actual use, though the use was private.

[Knox et al. vs. Loweree et al., 802.]

REISSUES.

It is to be presumed, from the fact of a reissue, that the inventions described in the original and amended patents are the same.

[Bantz vs. Elsas et al., 117.]

The question of fraud in obtaining a reissue must be regarded as settled by the Commissioner of Patents in granting it.

[Brown vs. Guild, 392; Brown vs. Selby et al., 392.]

It is to be presumed from the decision of the Commissioner of Patents, in granting a reissue, that it embraces the same invention as the original patent; and the contrary can be shown only by a comparison of the papers in the two cases.

A reissued patent can only be impeached for fraud by a bill in equity brought for the purpose by the government.

[Birdsell vs. McDonald et al., 682; Birdsell vs. The Ashland Machine Co. et al., 682.]

Whenever a patent is reissued or extended the presumption is that it is for the same invention, and the action of the Commissioner is conclusive against a charge of fraud in obtaining extension, or the reissue, as well as all other objections, unless it appears upon the face of the papers that the new patent is not for the same invention as the original.

[La Baw et al. vs. Hawkins et al., 724.]

Neither reissued nor extended patents can be impeached in suits upon them for fraud in obtaining them.

The granting of a reissue is conclusive as to its validity, unless it appears from a comparison of the papers that the invention is not the same with the one originally patented, or that the Commissioner has exceeded his authority in granting it.

[The Milligan & Higgins Glue Co. vs. Upton, 837.]

The validity of a reissued patent is not affected because it describes features not described in the original, and points out their functions, if there were shown in the original drawings.

[Bantz vs. Elsas et al., 117.]

A reissued patent held valid which claimed a spring constructed of an India rubber column inclosed in a spiral metal spring, although it

was conceded in the original application that such a spring was described in a previous patent, it appearing that it was not so described.

Although the original patent everywhere represented the India rubber column as deeply fluted, yet a reissued patent was sustained which claimed an India rubber column in unqualified terms, without alluding to the fluting.

The reissued patent was held valid, although it claimed the rubber column whether solid or hollow, and the original patent made no mention of a hollow column.

It was held to be no objection to the reissued patent because it suggested that any material which was the equivalent of India rubber might be used instead of it, such as animal or vegetable fiber, gutta serena, &c., although those materials were not mentioned in the original.

[The National Spring Co. vs. The Union Car Spring Manufacturing Co., 234.]

The complainant's original patent claimed glue reduced to minute shavings by a rasping process performed in a machine constructed to give the glue such a form and no other. His reissued patent described the same process and machine, and claimed the product. It was held valid, although it also contained amendments evidently intended to cover glue reduced to fine particles by crushing or other means.

[The Milligan & Higgins Glue Co. vs. Upton, 837.]

A patent for a combination of four elements cannot be reissued for a combination of three of the original elements with a substitute for the fourth, unless it was known at the date of the patent to be a proper substitute; and it should be explained, it seems, that the substitute is an equivalent for the omitted element, and why the change is made.

A patent for a combination of four elements, which does not suggest any other improvement, cannot be reissued with a claim for a combination of three of those elements, omitting all reference to the fourth.

A suit for the infringement of such a reissued patent cannot be maintained against any one who uses a combination of the three elements embraced in it, even though he uses with them a substitute for the omitted element.

[Gill vs. Wells, administratrix, 881.]

REJECTED APPLICATIONS.

An application for a patent which stands rejected will not, in such a case, avoid the subsequent patent.

[Brown vs. Guild, 392; Brown vs. Selby et al., 392.]

TRADE MARKS.

The name of an incorporated borough cannot be protected as a trade mark, even though it was adopted and used before the borough was incorporated, or there was a town in the place.

[The Glendon Iron Co. vs. Uhler, 187.]

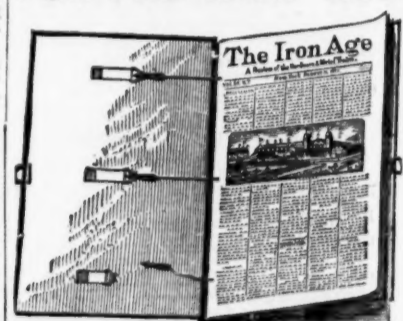
UTILITY.

In order to render a device patentable it need not possess greater utility or be better than others of the kind; it is sufficient if, being new, it serves a useful purpose.

[Crouch vs. Speer et al., 187.]

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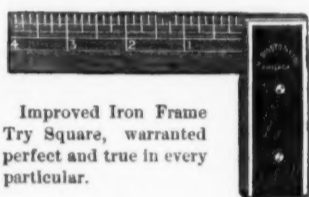
Pork Packers' Saw.



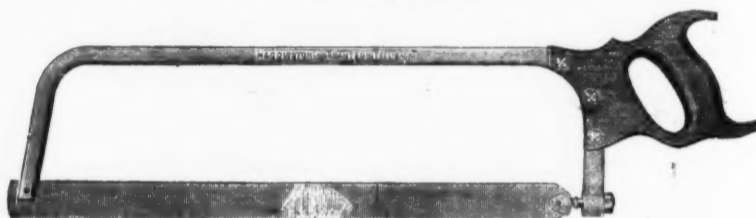
Improved Pruning Saw and Knife,
Patented August 29, 1873.



Mitre Box Saw.



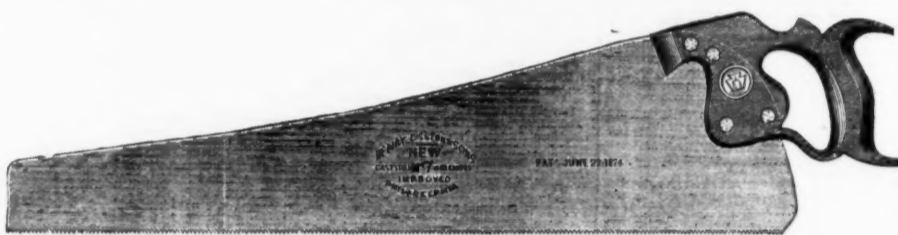
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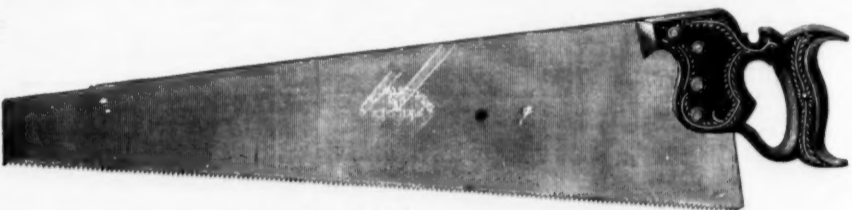
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Hand Saw with adjustable handle. The thumb screws in the handle operate on the butt of the saw blade, and can be so adjusted as to give the blade any desired pitch.



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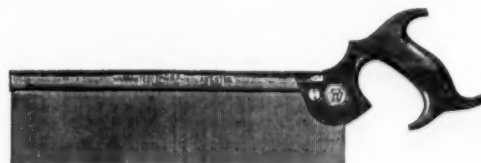
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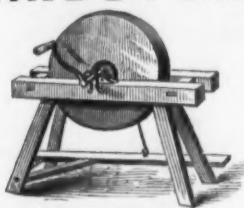


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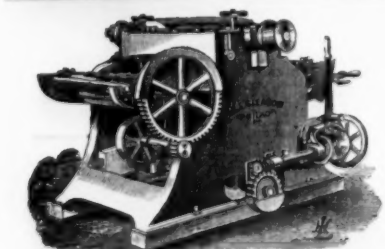
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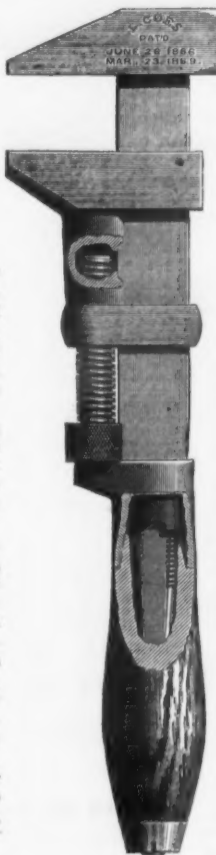
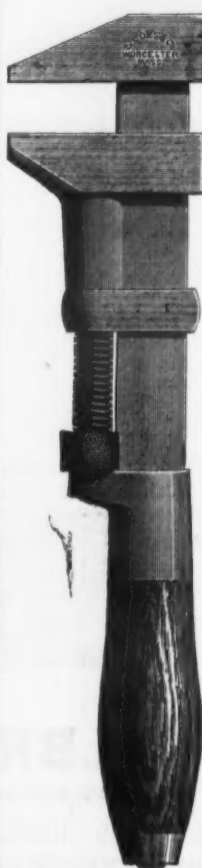
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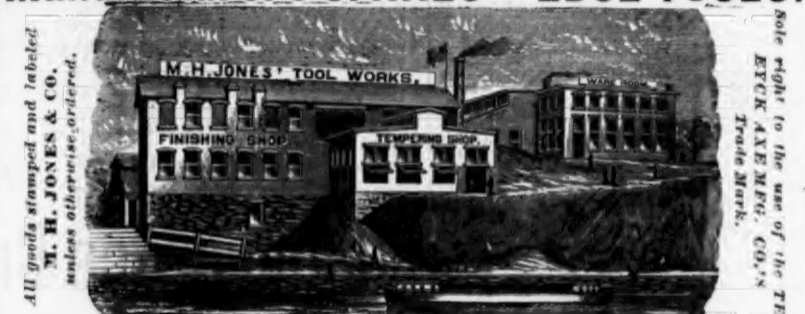
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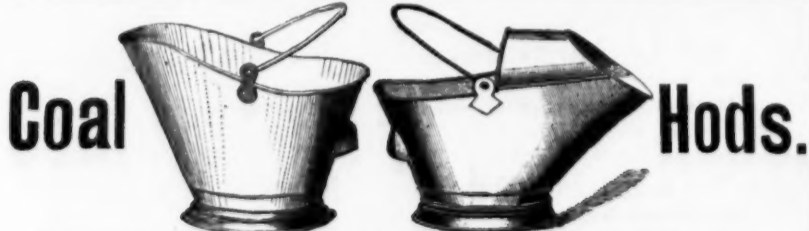
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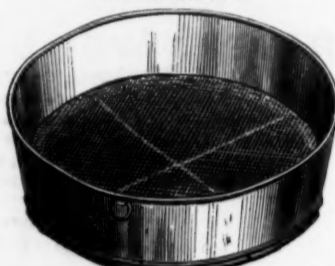
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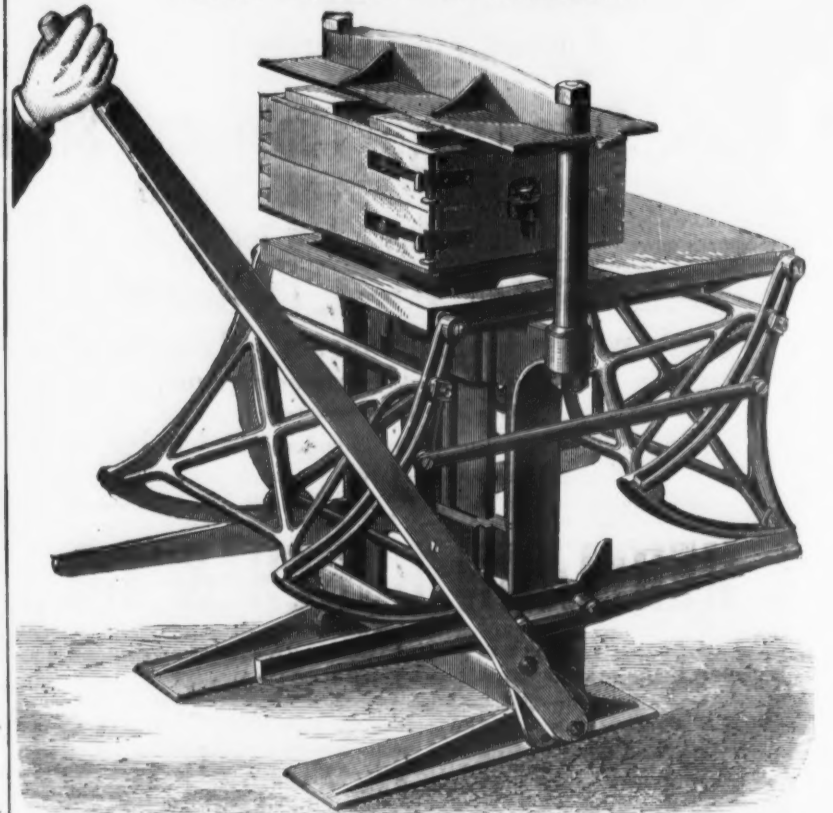
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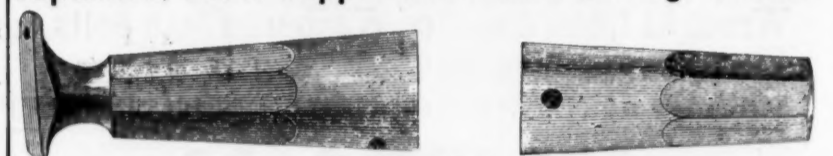
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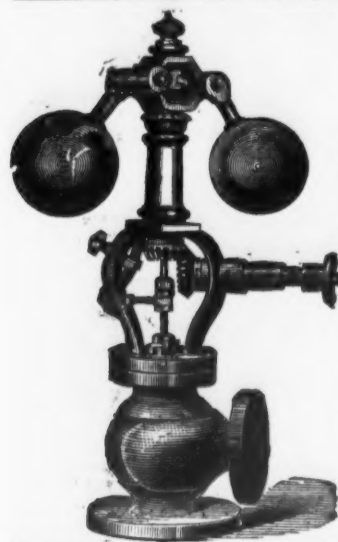
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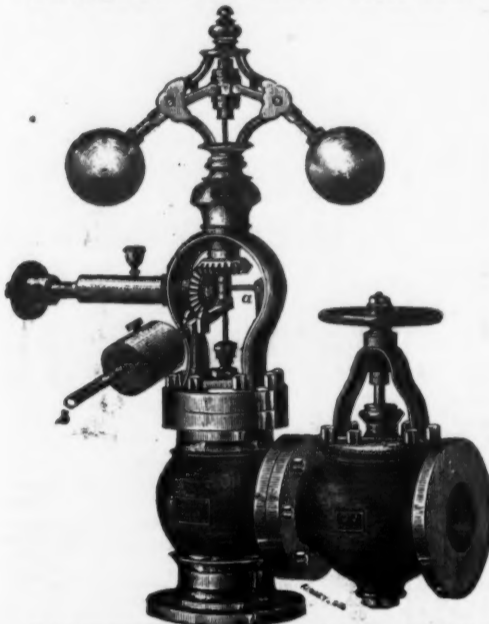
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W. Governors are ordered, be particular and say Governor with Stop Valve, or without Stop Valve; and either Black, Finished or Portable, as you may require, and with or without Lever Attachment. For dimensions and other particulars send for Illustrated List.

Capacity of Valve or Diameter of Stop Pipe in Inches.	Price, Black.	Price, Bright Finish.	Price, Portable.	Price of Lever Attachment for altering speed.	Price of Stop Valve.
1/2	18.00	20.00	17.00
3/4	20.00	22.00	19.00
1	24.00	27.00	22.00	2.00	5.25
1 1/4	28.00	32.00	27.00	2.25	6.50
1 1/2	34.00	38.00	31.00	2.50	8.50
2	41.00	46.00	38.00	2.75	11.50
2 1/2	47.00	54.00	..	3.25	16.00
3	50.00	57.00	47.00	3.50	17.00
3 1/2	55.00	62.00	..	3.75	19.00
4	62.00	70.00	..	4.25	22.00
4 1/2	71.00	80.00	..	4.50	27.00
5	81.00	92.00	..	5.00	32.00
5 1/2	91.00	108.00	..	5.50	37.00
6	102.00	114.00	..	6.00	42.00
6 1/2	116.00	129.00	..	6.50	48.00
7	134.00	145.00	..	7.00	55.00
7 1/2	160.00	176.00	..	8.00	62.00
8	199.00	219.00	..	9.00	83.00
9	230.00	255.00	..	10.00	..

No Charge for Box and Cartage.

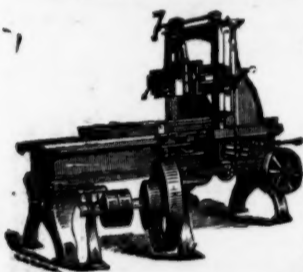
It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the above list. We guarantee the Judson Governor will do all any other Governor can do, and in Accuracy and Durability—the main essentials—we guarantee it shall do more.

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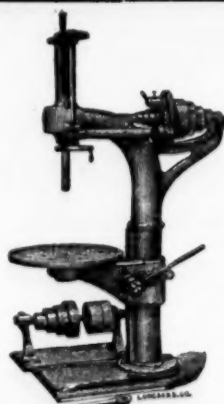
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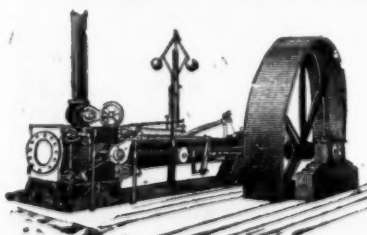
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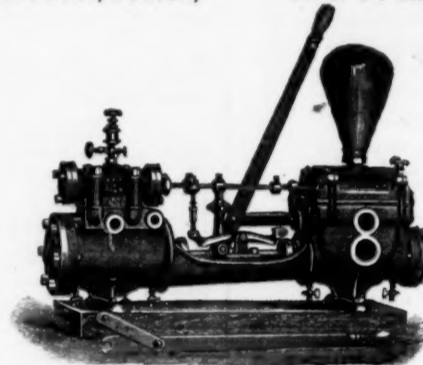
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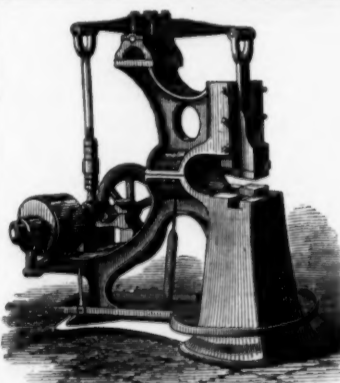
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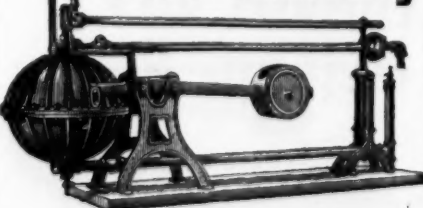


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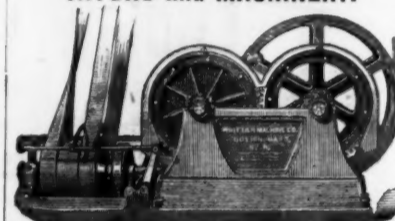
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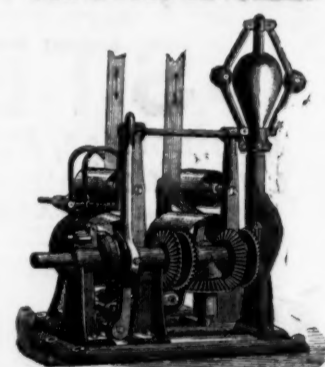
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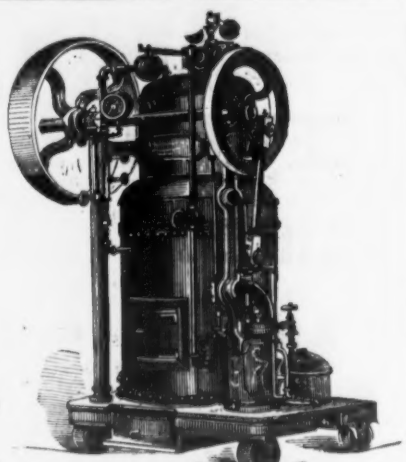
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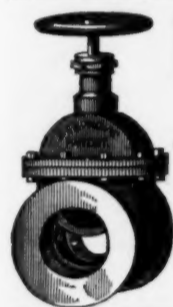


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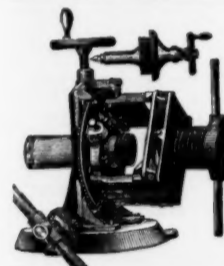


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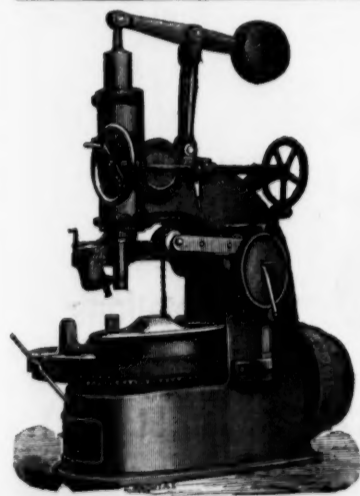
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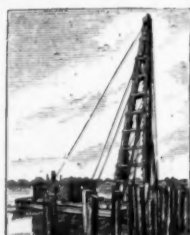
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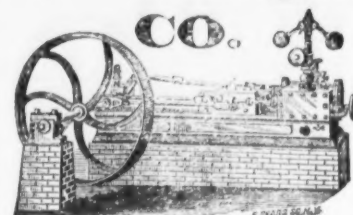
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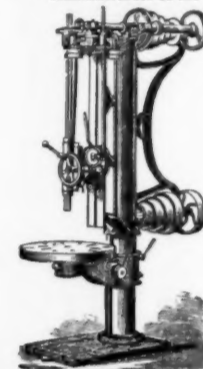
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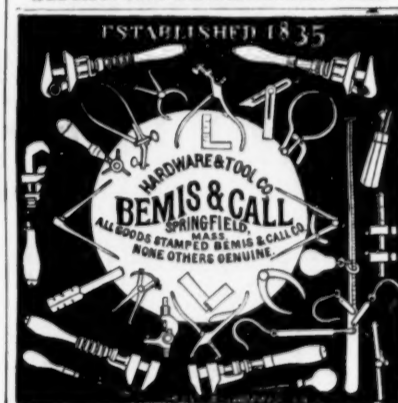
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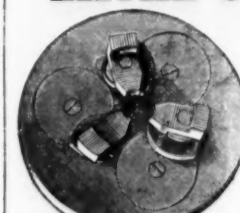
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